SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

GUALILAN GOLD MINES.

Mr. Joseph Vivian, jun., has favoured us with the following report on this property:—

As soon as the erection of the Oxland calciner is completed, which I consider by this time ought to be accomplished, there can be no excuse whatever as regards the produce, as at the mines there are millions of tons of available rich metal, and there is ample and proper appliances for treating the same; and they have also sufficient funds, force, stores, in short, everything which is necessary to make the mines pay, and in a few days the grand result must be expected, and in case the return is not satisfactory it will not be the fault of the mines.

Pique.—Previous to my leaving the mines I saw some fair samples taken from the bottom of this mine, which gave over 2½ ozs. gold to the ton.

There is another highly important point at Gualilan which demands immediate attention, and that is the "tailings," of which there are many thousand tons, and they have now the means of treating the same, which will produce as much gold to the ton as most of the original ores of various rich gold mines; these tailings alone will give splendid profits, and to confirm this statement it will be prudent for the company to communicate with Mr. Oxland, the chief reduction officer on the mines, on the subject.

It is satisfactory to know that in about two years more the railway will be extended to San Juan, which is a few hours journey to Gualilan, when all the machinery can be sent 2*l*. per ton cheaper than formerly, and in a quarter of the time, which may save thousands of pounds to the company.

When this group of mines—14 in number—all belonging to the Argentine Company (Limited) are being developed, they will be the largest, richest, and most profitable enterprise in America.

MINING IN THE EAST—No. XI.

COPPER SMELTING IN SERVIA.

Sir,—Maidanpek, being the head-quarters of mining in Servia, is visited by most of those who come to "do" Servia, especially by those who are connected with mining matters. These visitors have always shown great curiosity about the smelting-works, where copper ores are reduced by the Castillian ovens, and have displayed an earnest desire to know all about the various processes adopted. In fulfilment of a promise many times given the following paper has been prepared, and, although it is not pretended that copper smelting by the Castillian furnace originated in Servia, it is believed that some modifications have been introduced by which this method of reduction has been improved.

For the reduction of copper or lead ores in remote countries, where the mines are situated in virgin forests, and unprovided with proper roads, the Castillian furnace is admirably adapted, as it admits of utilising the existing labour, and demands the transport of no heavy machinery.

All the machinery requisite for the daily reduction of 20 tons of ore is a 20-ft. water-wheel, driving a 3-ft. ventilator, or sufficient blast for four furnaces.

The copper bars may with careful smelting be made equal to 96 per cent. of fine copper when the ores are free from obstinate sulphides, such as arsenic, antimony, &c. In the sketch given of the furnace the iron work has been shown cast and fitted; but this, though preferable, is not absolutely necessary, and any pieces of iron may be utilised which are sufficiently strong to support the hood. The description following has been made as practical as possible, and all details of furnace-working given.

Respecting the early history of copper smelting in Servia but little information can be obtained. That the Latins smelted copper and lead in various localities is probable, and it is certain that after them the Venetians were largely engaged in the production of metals, as the remains of numerous small works with almost obliterated water-courses found in the vales radiating from the various metalliferous deposit testify. Early in the 18th Siècle the Austrians erected many smelting-works, and in 1735 their reduction-works at Maidanpek produced an aggregate of 180 tons of *spleisskupfer*.

When the Ottomans recovered possession of their Servian provinces industrial occupations ceased, and it was not until 1854 that smelting was again commenced at some of the mines. At Maidanpek the Servian Government were occupied in smelting iron; later a French company obtained the concession to smelt both iron and copper. On their failure the concern passed into the hands of an English company, who began copper smelting in 1870 with the German *hochöfen* which they found erected; but, finding them work unsatisfactory, the Castillian furnaces slightly modified were built.

The method adopted for the smelting of the copper ores drawn from the Maidanpek mines is very simple, and, although to a superficial observer the manipulations may appear rough and defective, they have, nevertheless, arisen with the gradual development of the mines, and have thus been adjusted to suit the surrounding conditions. Numerous experiments have been made to improve the various processes so as to raise as high as possible the percentage of the black copper produced, and these have sufficiently demonstrated that the system as at present established is, as a whole, the most consistent with economical reduction.

The smelting of ores obtained from a single mine must ever be more difficult and uncertain in its results than at a large establishment, which, receiving ores of various descriptions from an extensive district, is enabled to prepare a persistent mixture for the smelters, who are, consequently, expected to get out a certain weight of metal in accordance with average results which long experience has determined.

The ores of Maidanpek are changeable, varying in character and value from the surface to the deep, and this has necessitated a corresponding diversion in the manipulation, which, though generally slight, has caused for a short period inferior smelting, owing to the inability of the workmen to adapt themselves to any innovation.

For the purpose of utilising so far as possible the water-power, and to be adjacent to the forests from whence charcoal and wood are obtained, two establishments for the reduction of the ores have been constructed; one at Bakarnitza, about four miles from Maidanpek down the valley of the Little Pek, built in 1855, and the other near the same town, erected in 1874. At the former smelting-works there are seven Castillian ovens—*fourneaux à manches*, three German *hochöfen*, a refining-furnace—*spleissofen*, and a rosetting hearth; also a Cornish crusher, for the preparation of brasque. The blast is obtained from a ventilator, driven by a broad 20-ft. water-wheel, supplemented by a 30-horse power steam blast cylinder machine, to be used in time of drought. At the new copper works, situated at Cusnitza, there are nine Castillian ovens, a 50-ft. reverberatory furnace, and for the grinding of brasque and quartz a 24-in. Cornish crusher. A 30-ft. water-wheel supplies blast to the ore-ovens, and a 20-ft. one drives a fan for the copper smelting-furnaces. There is also an 18-horse power steam-engine, to give motion to a ventilator in case of necessity. The constructon in 1875 of a large reservoir, to hold 93,000,000 gallons, renders it improbable that steam-power will for the future be required, and, in fact, during 1876 no such assistance was called for.

Before advancing to the description of the processes used at Maidanpek for the reduction of copper ores it is highly necessary to understand the nature and composition of the ores operated on. They may be distinguished as under:—

Sulphates.—These ores, which were found most abundantly near the surface and in the shallow adit, consist of sulphate of copper and alumina, quartz, and water in a crystalline condition. They enclosed from 6 to 8 per cent. of copper, and were easily smelted.

Black Oxides, so called, but consisting of black sulphides of copper and iron, with some clay porphyry, holding from 7 to 40 per cent. of copper. The average of the ores extracted was 11 per cent. They passed freely through the ovens, and the richest portions were roasted with the mattes, and run for black copper.

Kaolin Ores were found in large masses under a cap of iron, and contained from 4 to 7 per cent. of copper, principally in the form of carbonates and in flakes of pure copper. The name given to these ores sufficiently marks their refractory nature.

Red Oxides.—These ores were very rich in copper, often containing over 20 per cent. The gangue, principally quartz, with some kaolin, enclosed small regular crystals of ruby copper, disseminated throughout, to which it owes its colour. The deposit averaged 15 per cent.

Iron Oxides.—This deposit is almost entirely composed of brown ochreous oxides, which enclose blue and green carbonates, and a little red oxide. The percentage varies greatly, but the average of the ores mined has been over 6 per cent.

The ores above noticed are found in an immense deposit which forms the Tenka Mine. The sulphates and black oxides have been completely extracted, and but little kaolin ore of a percentage fit for smelting remains. At present the bulk of the ores obtained come out of the deposit of iron oxides.

Quartzose Ores are found in a mine immediately contiguous to the Cusnitza Reduction Works. They have proved most valuable as a flux for the smelting of the roasted mattes to black copper, and contain 4 per cent. of pure towanite, enclosed in hard crystalline calciferous quartz. Latterly they have been used to flux the iron oxides.

Sulphides.—These ores proceed from the Brankovitz Mines, and consist of tolerably pure pyrites, found in lenticular deposits, worth from 3 to 5 per cent. These lentiles enclose rich leads and masses of variegated and brown ores, holding from 6 to 40 per cent. of copper. Some portions contain arsenic and zinc, rendering reduction more difficult, and deteriorating the quality of copper produced from them.

The accompanying analyses of the oxidised ores from the north mines and the sulphuretted ores from the south mines determine the composition of the ores. The samples were taken from a carefully collected average of a whole year, and analysed by Prof. W. T. Rickard, F.C.S.:—

	Tenka.	Brankovitz.
Copper	5·31	3·45
Iron	25·36	34·60
Arsenic	—	1·60
Gold and silver	—	0·011
Sulphuric acid	2·72	—
Carbonic acid	6·50	—
Sulphur	8·70	38·22
Silica	20·45	21·30
Alumina	13·22	—
Magnesia	4·95	—
Lime	4·55	0·82
Oxygen	7·70	—
Undetermined and loss	0·54	—
Total	100·00	100·00

Want of the convenient proximity of the coal mines formerly possessed by the company has pointed to the almost inexhaustible forests of white beech with which the 70,000 acres of the domain are covered as the source of an enduring supply of fuel. Formerly the charcoal was made close to the smelting-works, but exhaustion of the contiguous woods has continually increased the distance of the place of fabrication, so that at present the Rohlung is two hours distant. The wood is carbonised by Wallachians and Bulgarians. The workmen employed in the reduction of the ores are exclusively gipsies—a slothful and unmanageable collection of irresponsibles, who cause constant losses of fuel by their inattention. Fitful and intermittent in their exertions, they are incapable of sustained action, and such is their extreme carlessness of consequences that no punishment can induce regular attendance to their duties.

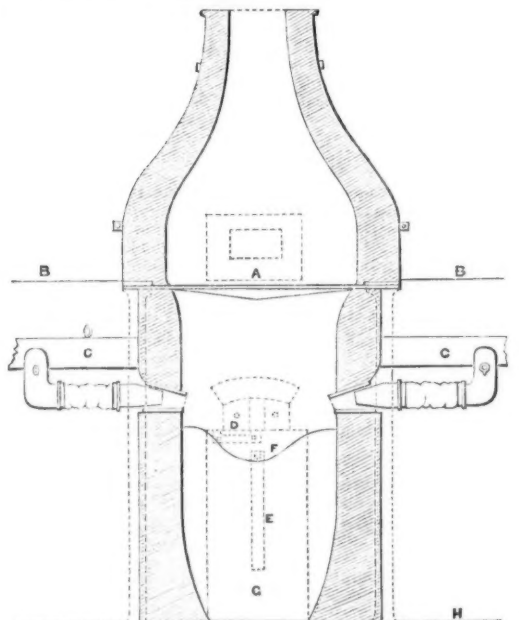
It was in 1870 that Mr. John Longmaid introduced the Castillian ovens to replace the cumbrous German *hochöfen*, which were always producing unwieldly iron "bears," the removing of which, from the permanent character of these furnaces, was difficult and expensive. The Castillian ovens could, on the contrary, with ordinary attention be kept in good running order, and if through carelessness or design it required blowing out the whole body of the furnace could be thrown down, and the bottom or a "bear" be "jacked" out in a short time. These ovens after some experience have proved most successful, have effected a decided economy both in labour and fuel, and, what is more important, have cleared the ores of a greater percentage of copper. The copper at present manufactured is sold as Chili bars, and contains 95 per cent. of fine copper. It is obtained in three operations, viz.:—

1.—The oxidised ores of Tenka, mixed with the roasted sulphides of Brankovitz, and "spalled" to a proper size, are passed through the Castillian ore-ovens and drawn out as mattes, which usually contain from 20 to 22 per cent. of copper.

2.—These mattes are then roasted from four to six times in the open air in heaps of 20 tons.

3.—The well-roasted mattes, mingled with about 25 per cent. of roasted quartzose copper ores, are run through slightly modified Castillian furnaces, and tapped direct into moulds of 135 lbs. capacity ready for sale.

As not improbably some may be desirous of knowing the approximative cost of and the mode pursued in erecting these ovens—so admirably adapted to meet the exigencies of remote countries—a vertical section, drawn to a scale of 4 ft. to 1 in., is annexed, from which their construction may be easily understood. To avoid the necessity for two engravings an attempt has been made to show the elevations by means of dotted lines.



A.—Feed aperture.
B.—Feeding platform.
C.—Main blast-pipe.
D.—Slag overflow.
E.—Tapping slot in breast-plate.
F.—Creuset.
G.—Breast-plate.
H.—Floor.

It is most important to have a firm foundation, 10 ft. square by about 5 ft. deep, made of infusible quarry stone, such as gneiss or crystalline slate, cemented solidly together with as good a fire-clay as can be obtained in the vicinity. This foundation must be free from damp, and, should there be any danger of water accumulating, the ground must be thoroughly drained. On this block, near each corner, are fixed 18-in. cubes of sandstone, for the support of the four hollow pillars, which are connected on the top by strong flat spreaders and it is these that bear the whole weight of the permanent brickwork. To facilitate the building of the hood a piece of cast-iron is placed diagonally at each corner. Each furnace may have an independent chimney, but should there be many furnaces the whole of the flues may preferably be conducted into a common shaft. The former method is the least expensive, and makes a stronger and more durable hood. The hoods may be constructed of good building firestone, or more advantageously of ordinary fire-bricks, 3000 of which are required. This constitutes all the permanent portion of the furnace, the shell of the furnace (that part which stands between the feed aperture and the floor) having to be thrown down and re-built at the conclusion of nearly every campaign.

The relative positions of the slag overflow, nozzles, and feeding platform may be recognised on the section, as well as the internal diameter, but these dimensions are subject to slight variations, according to the ores to be treated, and often to accommodate the smelters' notions. The dimensions above given have proved the most satisfactory for the reduction of ores mined at Maidanpek.

There are three nozzles, which are supplied with a blast-pressure of about 2½ in. of water. The sleeves are attached to the piping by iron bands furnished with screws. The permanent position of these furnaces last for years, and the cost of constructing them, inclusive of all charges, has been during 1875 as detailed below:—

	£	s.	d.
Foundation	4	1	0
Fixing pillars and spreaders	1	1	0
Building hood, 3000 ordinary fire-bricks	5	18	6
Four cast-iron pillars, each 3¼ cwt.	8	16	0
Four spreaders, each 3 cwt.	6	10	0
One breast-plate, 4 cwt.	1	15	0
One slag overflow	0	5	6
Four wrought-iron pins, 18 in. long, 1¾ in. thick	0	12	0
Wrought-iron binders, nuts, &c., 150 lbs.	3	12	0
Three nozzles, duck sleeves, and connecting pipes	2	7	6
Total	£34	18	6

This is the cost for the furnace only, with the pipes connecting it with the main blast-pipe, which passes behind the furnaces, nor is the feeding platform included.

The tools required are very simple and inexpensive, and cost new 8*l*. They consist of 3 cwt. of 6-4 in. sexagonal steel bars, used for tapping; 1½ cwt. of bars, forks, and rings; four barrows, six hand coal baskets, and some wooden shovels and poles.

Maintenance of the Castillian Oven.—The following details of the expenses of reinstating these ovens is the average of 101 campaigns run in 1875:—

	£	s.	d.
Throwing down oven, and removing the bottom—labour..	0	4	7
Rebuilding the shell of the oven	0	7	8
Brasquing	0	4	7
Stone and clay	0	16	3
Brasque	0	3	2
Replacing and repairing tools	0	4	9
Total	£2	1	0

As the company possesses a cupola all the ironwork needful for the furnaces has been founded on the spot, consequently no cost of transport for the cast-iron pillars, &c., has been included in the above estimate. [*To be continued in next week's Journal.*]

BORING BY MACHINERY v. HAND LABOUR.

Sir,—I have to thank you for publishing in full my short account of Boring by Machinery *versus* Hand Labour, in the Supplement to the Journal of April 14. I have only to notice one error of the printer—the omission in the Latin quotation of the little word "his," which destroys the sense. It should be as follows—"Si non, his utere mecum." A correspondent in the Journal of the 21st instant, upon Air Compressors and Rock Drills, quotes the letter of Mr. Critchett, of the Aurora and Eberhardt Mining Company, in which the latter boasts of driving a level 7 ft. by 9 ft., at a cost of 6*l*. per foot; surely this must be a mistake—36*l*. per fathom! Why, Sir, my level, 6 ft. by 4 ft., as stated in my pamphlet, has only averaged 5*l*. 10s. per fathom for 560 fms.; less, therefore, by five-sixths. The total cost of my level, including interest on the capital, the prime cost of the six borers used and their repairs, and all contingent expenses both outside and in, amount to only 8*l*. 10s. per fm. Every patentee, as another of your correspondents observes, swears by his own machine. I am not a patentee, but I swear by the McKean drill, and I challenge the whole world to show the same amount of work done for the same money.

I feel pretty sure that after perusing my paper no man of sense will ever again undertake such a foolish contract as in my exuberant zeal I was induced to do. I have worked seven years for nothing, and my object in writing this letter is to explain the cause of it, to show the kind of bargain I ought to have made, and to extract from those of your readers who are conversant with such matters their opinions upon the subject. I ought then to have made a special agreement for extra price for extra speed, and an allowance per head per shift for the air furnished by the compressor, without which not a man could have worked inside the mine.

The questions I wish to put are the following:—The contractor having agreed to drive at hand-labour price, what ought he to get extra if he progresses at double hand-labour speed; what if treble; what if quadruple? Would 25, 50, or 75 per cent. for the respective increase of speed be too much? Secondly,—The premium for speed being agreed upon, how and in what proportion should it be divided between the contractor who provides the machine and the men who work it? I submit they should go halves.

Suppose eight men by ordinary hand-labour can drive 9 ft. in a week, at 8*l*. per fathom; they would have 12*l*. to take, which, after deducting 3*l*. 2s. 6d. for candles, powder, and drawing, would leave them 8*l*. 17s. 6d. clear money, or 1*l*. 2s. 2½d. per man. Suppose the same eight at the same price could with the borer drive 18 ft. in a week; they would have to take 24*l*. for the 3 fathoms, from which would have to be deducted—

	£	s.	d.
Contractors' charge for borer, 2*l*. per fathom	6	0	0
Stoppages	6	5	0
Wages to men, clear	11	15	0
Total	£24	0	0

Equal to 1*l*. 9s. 4½d. per man per week.

Double distance would have been driven in the same time and for the same money. The men would have earned 13d. a day more, but the contractor would have received no additional benefit. If, however, we were to add a premium of 25 per cent. on the additional 9 ft. driven, and to divide the amount between the contractor and the men, we should have 3*l*. more to divide, which would be equal to 3s. 4d. a foot, or 1*l*. per fathom, extra to the men, and the same to the contractor. This extra wage would be a great inducement to the men to throw all their skill and industry into their work, and the contractor would have a fair chance of getting his money back again. If treble or quadruple speed could be obtained, and the premium increased according to the same ratio as the speed, it would *a fortiori* be much better for both.

But the question here arises—Would it be a wise policy, commercially speaking, for the company to pay such extra price for such extra speed? If not, what would be a fair ratio of increase? The justice of the principle cannot be disputed. The saving of time is the saving of money. The only difficulty is the fixing of a ratio of increase fair and equitable on both sides. I think, also, that it must manifestly be more profitable to a company to work the borers and themselves supply the requisite machinery than it is to let the whole job to a third party.

Permit me, in conclusion, as a lessor to notice the abstract of the paper on Mining Leases, as read by Mr. Symons, at the Mining Institute at Truro, and given in the Journal of the 21st instant. Many of Mr. Symons' remarks are excellent, although they do not apply to all districts; but with some I take leave to dissent. In this district no rent is ever charged for the mining sett. The ground being all common or waste land there is no surface damage to pay for, unless

it be done to old enclosed lands. Roads may be made, water diverted or stored, stone quarried, peats dug, houses and all other necessary buildings erected, without anything to pay except the labour of getting, making, building, and keeping in repair. No building erected for mining purposes can be removed or sold. At the expiration of the leases all except moveable plant becomes the property of the lessor.

If lessors were only to receive their "dues" out of the profits made by the lessees they would in the great majority of cases never receive any dues at all. They might as well make a present of their property to the first enterprising speculator that comes to hand, who would, of course, immediately sell it, and realise a handsome sum for himself—for the whole lot of guinea-pig directors, brokers, engineers, and the *hoc genus omne* who usually fatten on such concerns at the expense of the unfortunate shareholders, who, tempted by the jobbers to buy at a premium, speedily find themselves left in the lurch. No lessor should ever give a lease, tack-note, or promise of lease to one of these company-mongers. Four-fifths of the mines in this country have been ruined by the share-jobbers. It is the fashion to cast the blame on the greediness of lessors, but it should be laid on the greediness of sharks. As far as my experience goes if a mine when properly developed cannot pay a good royalty without feeling it, it would not pay if the company had it for nothing. Would any sane landlord let a farm with the rent to be paid only if the farmer made any profits? Why should he act differently with a mine? If a mine produces nothing the tenant has nothing to pay; if it produces the lessor is entitled to his royalty. No lessor ought ever to allow a lease to be set, let, or assigned—a common practice, which opens the door to every species of rascality. Of all markets the mining market is the worst. GEO. WM. DENYS.

Draycott Hall, Richmond, Yorkshire, April 23.

LANZI MINES—THE PATENT DRY ORE CONCENTRATOR.

SIR,—In reference to Krom's patent Dry Ore Separator, referred to in the Supplement to the *Mining Journal* of April 14, a letter has been received as follows:—

"*April* 20.—To the Lanzi Mining Company (Limited): My correspondent has cabled that the machines and expert would leave New York this day. I calculate they will arrive at Bristol on Monday week, the 30th, *en route* for Swansea. I have advertised this to Messrs. Richardson."

It is probable that it will be towards the close of the week before the machines get to and are fixed for working at Messrs. Richardson and Co., Swansea. Prof. Bell, who was employed by the Lanzi Company to test the results, says that he confidently looks forward to the projected trial at Swansea to bear out the conclusions he arrived at from his experiments—that the verification of actual working on the large scale will revolutionise the mining world.

EXPECTANT.

AUSTRALIAN GOLD COMPANIES.

SIR,—The queries of "An Investor," which appeared in last week's Journal, will be very willingly replied to by me if, in common fairness, your correspondent will kindly give his name.

April 25. THOMAS DICKER.

THE CHONTALES MINE.

SIR,—As the half-yearly meeting of shareholders is about to be held, it seems desirable to bring a few particulars prominently before their notice, and see if the valuable property owned by the company cannot be so conducted as to yield satisfactory results to its owners. Now that all the new machinery has been delivered at the mines, and most likely erected, with a yield of only 4 dwts. per ton of ore and 2 dwts. per ton of tailings, surely 2000 to 2400 tons of ore ought to yield a profit of 1500*l.* to 2000*l.* monthly. The result of the last few months workings has been discouraging, but the new manager has all along pleaded for time until the new machinery was erected and the mines properly opened out (which had been allowed to fall into sad disorder), and a good supply of water received, which has now most likely fallen, when he would be able to give satisfactory results.

I hope the present manager will be continued a little longer in office, when he will have had full time to test his promises and predictions. I trust the attention of the shareholders will not at the meeting be diverted to working the Pavon property, but be concentrated on the present works, and extracting a few dividends out of them, of which the proprietary are greatly in need, and which with proper management they are capable of affording. It would be very desirable to send out someone to inspect the mines occasionally, as it would strengthen the hands of the manager, and give more confidence to the shareholders, and prevent the mines being almost stopped from the want of machinery. R. T.

Durham, April 27.

LEAD MINERS THEIR OWN SMELTERS—THE BURRY PORT SMELTING COMPANY.

SIR,—The statement in last week's *Mining Journal* that the debts of the Burry Port Smelting Company amount to 165,000*l.*, whilst the assets are but 18,000*l.*, is sufficiently discouraging on the face of it, yet I think it is not improbable that every creditor may be secured 20s. in the £, in addition to an ultimate advantage which will far more than compensate them for all the inconvenience they have been put to. As I see from your notice that Messrs. Lavington, Murchison, P. Watson, and F. R. Wilson (I give the names alphabetically) were present, there can be no question as to many of the largest holders of lead mine shares being represented, and there is at the same time a guarantee that the interests of the miners will be well understood. As I have seen no list of the creditors, and do not, therefore, know the claims of each, it cannot be supposed that I write other than in the interest of all alike. With 165,000*l.* of debts, and 18,000*l.* of assets, it is evident that even if the winding-up cost but 12*l.* there would be only 2s. 1d. in the £ for the creditors. In the ordinary course of things, however, the creditors will not get 1s. in the £, for if lawyers take the oysters and leave their clients the shells, it may with greater truth be said that liquidators and accountants not only take the oysters, but also find a means of appropriating the shells also, and aggravate the matter by their enormous waste of time in closing the affair.

It may, perhaps, be safe to assume that the Burry Port creditors will receive their first and final dividend of 1s. in the £ in 1880 or 1881, so that the present value of their rights thereto is certainly not large. I do not know, but will for the moment assume, that the 18,000*l.* assets is represented, at least to a great extent, by the smelting plant which is, of course, in full working order, and it is my opinion that the whole affair could be closed in a month, with advantage to all concerned, by a very simple arrangement. Let the representatives of the creditors offer the representatives of the Burry Port Company a full release upon their transferring the whole property to the creditors, and paying an amount to be arranged between the transferors and the transferees, the latter accepting such an amount as the debtors could at once pay, so as to close the account. An arrangement would be concurrently made to form a "Miners' Mutual Smelting Company," with limited liability, and a capital of 200,000*l.* in 1*l.* shares, 165,000 of which shares, considered as fully paid, would be given to the creditors as discharge of the amounts due to them, on condition that each creditor should, if required, subscribe and pay for one share of 1*l.* each for each five fully paid shares allotted to him. This would give 35,000*l.* working capital (in addition to any balance from the 18,000*l.* assets) for carrying on smelting operations which, as no ore would have to be purchased, would be ample. The chief shareholders would thus be the companies which are at present the creditors.

The Miners' Mutual Smelting Company would be ready for operations the day after the arrangement would be concluded, and the shareholding companies and any other mines that chose to do so would send in their ore to be smelted. The smelting company would forthwith smelt the ore in the order received, and return the pig-lead to the mining company (retaining so much as would represent the cost of smelting and 10 per cent. thereon for profit), or undertake its sale on commission. As the smelting company would have its organised selling staff, the commission would, no doubt, be in most cases preferred by the miners. This, however, would not affect the principle.

The advantage to the creditors is obvious. Every mining company would secure an immediate advantage equal to the difference between 10 per cent. and the smelter's usual profits, and the present Burry Port creditors would, as shareholders in the Miners' Mutual Smelting Company, receive the proportion of the 10 per cent. equivalent to their present debt, and not only until the debt will be liquidated but permanently. The present Burry Port creditors should well understand their position. Nominally they appear to subscribe 200,000*l.*, but practically they only pay down 35,000*l.* (which they could reimburse themselves by re-selling shares to that amount), and forego the chance of 8750*l.* in all, or 1s. in the £ dividend in 1880, or after. By the present smelters' failure miners have an opportunity of becoming their own smelters upon such easy terms as may never again present themselves; most of the creditor companies could pay the cash required out of their reserve fund, and the others could very readily raise it, for each 100*l.* due from the smelting to the mining company only demands a contribution of 20*l.*, and the works to be acquired are in full working order, and are those the miners are accustomed to send their ores to. If the miners do not avail themselves of the present chance they will certainly have no justification for complaining of smelters' profits in future.—*April* 23. FINANCIER.

CHAPEL HOUSE COLLIERY

SIR,—This week I found my way to the Chapel House Colliery, and, like the Queen of Sheba, I had heard much and read much of it in the *Mining Journal*, howbeit I believed not the words until mine eyes had seen it, because some people will make it appear black is white, and say anything almost but their prayers if only they make a pound by it, no matter if others throw away thousands. I am sorry we have so many selfish people in the world to look only for their own profit, and the great loss it causes others never affects them. How many capitalists have been ruined by misrepresentations? However, if I have any judgment of collieries, there is no misrepresentation in the Chapel House Colliery; it is, and will be, one of the finest in the kingdom. I am glad to be able to say that, and to me it is a pleasure to find any person or company in a prosperous state and doing well. I think for a person to have spent over 40 years in mines and mining, and passed (as I have done) through every stage, he should be able to judge as to the state of mines. If the managers (and no doubt they will do) cut out good substantial tramways and air-gates in the new mines, and support them with large blocks or pillars of coal betwixt such and the goaf, not as some do, work out the inside of the pit first, the profits will be large for the shareholders. I know no one at the colliery, neither manager nor shareholder, I simply give my opinion. The colliery is situated about 9 miles from St. Helen's where I reside.

St. Helen's, April 25. WILLIAM HOPTON,
Author of the "Conversations on Mines."

CLEMENTINA.

SIR,—Little more than six months ago (Sept. 2, 1876) I called public attention through the columns of the *Mining Journal* to the injury that had been done to the mining interest generally by the way in which many companies had been formed, ostensibly for working mines, but in reality to put large sums of money into the hands of promoters and owners of setts.

Many of the latter had been purchased for a few hundreds of pounds, and brought out for many thousands, three-fourths of which, perhaps, went for the purchase of the properties, leaving insufficient capital to work them. Thus many mines which had cost large sums of money had to be wound-up for the want of means, at the very time success seemed all but certain.

I then stated that to inaugurate a new mining era, and give the public an opportunity of going into a good lead mine without any premium or promotion money whatever, it was proposed by two or three gentlemen to purchase a mine upon which upwards of 15,000*l.* had been spent, and which had at one time stood very high in the market, and had made large returns of lead down to the bottom or 25 fm. level, when the company failed for want of means to sink deeper.

I may add here, what was well known at the time, that before the old company fell into the hands of the liquidators, two years before my letter appeared, the directors, after 17,400*l.* had been spent upon the property, had taken every means in their power to raise fresh capital, which might as they then considered have resulted in success; but all their appeals to the shareholders were in vain, owing to the badness of the times. The liquidators for two years afterwards advertised it, and took every means in their power to dispose of the leases and plant, but without success, till at last, compelled to sell they offered it at a price which was considered a very favourable one for the experiment I had suggested.

This was that a small company should be formed under limited liability, in 128 shares of 20*l.* each, to purchase the property, and that the whole of the shares be offered to the public at cost price.

It was considered that the capital thus raised (2560*l.*) would purchase the property, sink the shaft 20 fathoms deeper, and open out lead ground that would prove its value, if not make it a dividend property, and then according to the wishes of the holders the shares could be made into a large number, and the company (and capital if necessary) be increased in such a way that would give a good and fair premium to the original subscribers.

Soon after my letter appeared in the Journal the 128 shares were all applied for and taken, and were soon sought for at a premium. Out of the capital raised (2560*l.*) the Clementina Mine (with lease, engines, water-wheel, crusher, &c.) was purchased for the sum of 522*l.* 18s. 10d.

After the company was properly formed and registered, and certain repairs and preliminary work done at the mine preparatory to sinking the shaft below the 25, that work was commenced at the end of November.

It was my original intention to write you and report progress at the end of six months from my first letter; but I have only this week received the information which enabled me to do so. Capt. Roberts, who has just been appointed superintending agent, went underground on Monday last to report to me upon the work done since he inspected the mine at its commencement, and to give his opinion of its present position and its future prospects. He says the shaft has been sunk 6 fms. below the 25, and the lode is now good for lead the whole length of it; the north end is worth 1½ ton, south end 1 ton—or 2½ tons per fathom. The 15 end has been driven 4 fms., producing a little lead. The 25 end has been driven 8 fathoms, and worth 1 ton of lead per fathom. This is now under a winze sunk from the 15, and a rise has been commenced to communicate with it and open out lead ground. This rise, like the end, is worth 1 ton of lead per fathom.

In reference to the prospects, he says should the shaft continue as it is to the 35, and the lode at that level be worth 1 ton per fathom, we can when the ground is opened out return 20 tons of lead per month, worth 300*l.*, at a cost of 150*l.* The shaft is now within 4 fms. of this depth, and the present monthly cost about 60*l.* only.

Out of the capital raised (2560*l.*), 522*l.* was paid for the property and 437*l.* has been spent on the mine, including expenses of forming company, preliminary expenses at shaft, on the machinery, and in driving levels and sinking the shaft to its present depth, &c.—so that there is a good and ample capital still in hand, and no liability whatever.

Not expecting such a rich lode in the shaft so soon, my original idea was to sink it 20 fms. deeper without stopping, and then open out the ore ground; but now we are told we may commence to drive very shortly (after 4 fms. further sinking), with every prospect of making 150*l.* per month profit, or 1800*l.* a year, on a paid-up capital of 2560*l.*—equal to about 70 per cent., or 14*l.* per share per annum. Another 10 fms. in the shaft I hope will double even this result.

"The intrinsic value of the mine," Capt. Roberts adds, "has increased 100 per cent. since I last reported upon it."

The object of the directors has been to prove the mine as quickly and as cheaply as possible, and not to spend money on *surface operations* until lead was assured. The present machinery, consisting of water-wheel and auxiliary steam-engine, with crusher and dressing-floors equal to about 20 tons per month, will, therefore, want replenishing by an extra water-wheel, reservoir, additions and improvements to the dressing apparatus, &c.—but all this can be done as soon as required, and will not make a very great hole in the capital.

The D'Eresby Mountain Mine, about a mile off, included in the same lease, and which was described by Capt. Roberts at his visit some time ago as a mountain of lead, and having the Llanwrst lode, has been formed into a company, and is in full operation, but I defer any remarks upon it until Capt. Roberts has inspected it for the second time. It is in 512 shares, 20*l.* paid, with a working capital of 2560*l.*, the whole of which was subscribed by Clementina shareholders, who also received the difference in fully paid up shares.

I may add, however, that 20 tons of blende have been raised from a shallow adit, the lode in which is worth 3 tons per fathom; that the deep adit is being driven on a good lode to get under a well-known winze rich for lead, and when communicated, good returns will be made at once. No machinery is required, except a water-wheel and crusher for dressing ore.

Those who followed my advice in regard to Clementina, six months ago, can more than double the money they invested, and in another six months will, probably, double it again; with a rise also of 50 per cent. on D'Eresby. J. Y. WATSON, F.G.S.

1, *St. Michael's-alley, Cornhill, April* 24.

WATER-WHEELS.

SIR,—I beg through the columns of your valuable Journal to thank "H. C." for his letter of the 16th. It was intended to ask what size turbine would be of equal power to an over-shot wheel of 40 ft. by 4 ft., and whether the turbine would require much more water than the over-shot wheel? Would "H. C." kindly state if his turbine 2 ft. 6 in. in diameter and 1 ft. 8 in. wide, which under a head water of about 18 ft. high could be made equal to a water-wheel 40 ft. by 4 ft. would be delivered in complete working order at any particular foundry or railway station for the sum of 30*l.* I write for information, and "H. C.'s" reply may lead to business.

April 24. ENQUIRER.

MINING LEASES.

SIR,—Having read with interest in the Journal of the 21st inst. Mr. Symons's paper on this important subject, I beg to remark that the landed proprietors of Cork and Kerry grant mining leases on more liberal terms than the landed proprietors of Cornwall and Devon. We hear a good deal sometimes about bad Irish landlords from sham patriots and political agitators, but as a general rule they only exist in their imaginations. I will just give three instances—1. A lease of a mine was recently granted in the County Cork for 31 years at a royalty of 1-20th on the marketable produce. This mine was formerly worked to a depth of 30 fms., and made large profits.—2. A lease was granted not long since in the County Cork of a mineral property extending over 1500 acres for 31 years at a fixed rent of 30*l.* a-year free of royalty. Numerous splendid copper lodes in this property run into a mountain 1000 ft. high.—3. A lease was recently obtained of a mineral property in the County Kerry more than two miles long on the run of the lodes, commanded by unlimited water-power, and containing numerous lodes of silver-lead, blende, copper ore, arsenical pyrites, and iron ore. Blende and silver-lead in some places may be quarried in the carboniferous limestone at surface. The terms of this lease are 31 years; royalty 1-16th on lead, blende, and copper ore, 6d. per ton on iron ore over 50 per cent., and 4d. per ton under 50 per cent. In all of those leases there is a clause to the effect that surface damage to land or crops shall be determined by two disinterested persons—one of whom to be appointed by the lessor, and the othey by the lessee, and if the two cannot agree an umpire is to be appointed by them, whose decision is final. There are other liberal clauses as to the taking down, re-erection, and removal and disposal of machinery, buildings, &c. With judicious selection of mineral property in the South-West of Ireland for *bona fide* mining the capitalist would be certain to realise handsome profits. WILLIAM THOMAS.

Cappagh Mine, Ballydehob, County Cork, April 24.

MINING IN CORNWALL—THE ST. BLAZEY DISTRICT.

SIR,—I saw a letter in last week's Royal Cornwall Gazette, written by Capt. P. Rich, of St. Blazey, in answer to some questions put to him by a correspondent of that paper on mining in St. Blazey, and I trust the remarks will receive great publicity. Herewith you will find a copy:—

Capt. P. Rich writes—Kindly allow me space to answer the question put to me, in your issue of the 13th inst., by your Tywardreath, Par, St. Blazey, and Biscovey correspondent, in reference to mines of the 29th ultimo. Your correspondent says—"I see the ominous announcement of the collapse of the St. Blazey Minerals Company." He is evidently not aware that the sett is re-granted to a highly respectable and wealthy local company, and is to be re-worked at once with great vigour. In this property are three splendid beds of china-clay, to be granted to new companies. I wish the new company every success. Your correspondent is quite correct in saying that "there is a considerable amount of mineral in the district," and all that is required is a good capital to work it to make profitable returns. There is mineral enough near surface, if money be forthcoming, to develope it as a legitimate investment. When tin was at a fair remunerative price lodes, branches, and debris in the Prideaux Wood Hill were stamped all as it came, and gave one-half profit; and if tin were now at the price it was then different other places could be worked at a like profit. Some time since ten good working miners applied for grants to erect water-stamps at their own expense, and stamp on the backs of lodes in hills at one-half tribute; but this was refused them, as it was considered it would interfere with the granting of the properties for deep mining.

Respecting the question of royalty the lords will be very easy—this will have to be arranged according to the capabilities of a company. The cost of working will depend on the extent of capital. If your correspondent were a Cornish miner of this district he would not ask what the cost of putting tin on board ship will be. I am sorry to say that in this neighbourhood we do not raise such large quantities as to require shipping it, instead of which we sell it to the smelter in Cornwall.

Referring to the cost of raising iron ore and putting it on board ship, and the St. Blazey Minerals Company. The cost of raising and sending iron ore to surface, including all cost at their mine, is 2s. 6d. per ton; royalty, 6d.; cartage to Par Harbour, 1s. 3d.; quay dues at Par, 7½d. I cannot approximately give the cost for agency, timber, &c., as that will depend entirely on circumstances, and I should not be justified in mixing with the agent's affairs. At this mine the lode in the 15 fm. level in the present end is 4 ft. wide, yielding 12 tons of iron ore per fathom, and there are nearly 200 fms. of ground in reserve, which will yield 10 tons per fathom—so your readers can see there is a good prospect for the new company. If any person will take a walk to the Par Wharf he will see there nearly 1000 tons of iron ore which came from this mine, and is, in my opinion, as good in quality as the country will produce. We have other iron ore setts to grant.

We have not at the present price of minerals places that will at once profitably pay for working, but are good speculations, and can hardly be called ordinary speculations—in which a great number of lodes have been cut at surface, in deep cuttings, and in shallow adit levels, from which slabs of tin and fine specimens of copper ore have been broken. If these were now dividend-paying places I should have no need to invite speculators to come here and invest—the lords or the miners would work them themselves.

In my opinion intending mining speculators would do well to avail themselves now of the opportunity to select good grants in new ground, and get in working order, to make profitable returns when the change in the price of minerals comes—grants at that time will fetch very high premiums. It grieves me to see the distress in this district when I know it can be remedied. Again, I say as the lodes have improved so much in depth where last worked on (20 fms.) very large returns of tin and copper and lasting deep mines will be made, such as the old Fowey Consols Mine, which is 340 fms. deep perpendicular, and in this mine, it is said, there are more miles

of levels (or galleries) driven than will reach from here to London —285 miles. This mine gave a profit of upwards of 350,000*l.* on a very small outlay, and at one time returned upwards of 1400 tons of copper ore per month, above the average per cent. of copper ore in the county, and gave employment to 1500 people.

The once celebrated Par Consols is also in this district, is very deep, and gave much larger profit than the before-named mine for tin and copper ores, and not called on the shareholders for a single shilling. In the beginning they cut a bunch of ore in the adit level, and thus they prosecuted the mine on its own resources. Without a question many such mines will again be opened in this district on the same and other lodes; the prospects are equally good.

Tywardreath, April 23. ——— E. MITCHELL.

MINING IN CARDIGANSHIRE—MONYDD GORDDU.

SIR,—It is gratifying in the extreme to hear of the success assured to the above company by the late discovery at the bottom of the mine; all interested have much to be thankful for in these times of depression. The discovery has attracted the humble mining captain, eminent engineers, and notable people from London; and very pleased was I last Monday to hear all hands speak most favourably as to its worth, and probable permanency. This discovery ought to cause more attention to Elgar, adjoining to the west. Why they are so slow I cannot understand, as I am of opinion that the mine, or champion lode, running through that property, Monydd Gorddu, Pantyffynon, Havon, Henfwlch, &c., will prove profitably productive, as it has done, wherever worked on a scale commensurate with its lead-producing power. As proof of the enormous quantities returned from it at Havon, I refer to the existing records of the royalties paid to the Crown in our British Museum. A few prickings here and there are not sufficient; but a systematic working is alone needed to ensure success on a fair development. Havon is the deepest mine worked on this lode, and the results on record speak for themselves. Monydd Gorddu, I believe, is the next; and prospects point to similar results at hand. The workings at Elgar, on the lode, have been confined to driving an adit, principally on the south side, with just a prick or two into it, never cut through; the shaft is 10 fms. deeper, I believe, and a few feet only driven on the lode. I have seen some very promising lead from the bottom, and believe the property worth better attention. Pantyffynon is a new sett to the east of Monydd Gorddu and west of Havon, on the same lodes. Trial pits have been sunk on the lodes, and good lead found within a few feet of surface, proving most conclusively that this great lode is rich in lead for many miles through the country.—*Tycam, April 26.* ——— JOHN JONES.

CAPT. TREGAY, AND PEDN-AN-DREA MINES.

SIR,—As this correspondence arose in the first instance from some remarks of mine at a public meeting, I have, of course, taken an interest in reading the letters which have appeared in the Journal for some weeks past.

I notice that Capt. Tregay denies the accuracy of the figures given by "W. X," so I have taken some trouble to look into the matter. I have seen the official balance-sheets issued by the late company, and nothing can be clearer than that the loss stated by "W. X." during the final 14½ months was quite correct—16,525*l.*—while the calls amounted to 15,820*l.* I cannot understand how Capt. Tregay can deny these facts, but, from the style of his letters generally, perhaps one must not be surprised at any statement he may make.

GRANVILLE SHARP.

Gresham Buildings, Basinghall-street, April 26.

CAPT. TREGAY, AND PEDN-AN-DREA MINE.

SIR,—In reply to Capt. Tregay's letter in last week's Journal, I do not intend to allow him to escape from the serious position he has got himself into by his shuffling and evasive remarks, in the way which he now attempts. He says that I have "shown bad taste by giving the lie to my (his) statements." Capt. Tregay is quite welcome to apply this language to what has occurred if he likes, but I may tell him that I shall continue, if necessary, to give facts in opposition to his misstatements, though he may think it bad taste to expose his fallacies.

But if Capt. Tregay has the strong aversion he professes to anonymous writers, why has he occupied so much of your space in trying to reply to my letters, and to mystify and confound the facts? With such views as he expresses one would suppose that he would have avoided any correspondence, and much more refrained from making assertions that were not true. Having gone into particulars he must take the consequences of committing mistakes. From the tenor of his last letter I draw the conclusion that he sees it is useless to contend longer against the truth, and that he now considers it more discreet to keep silent altogether than to try to parry inconvenient questions.

As well known, Capt. Tregay was manager of Pedn-an-drea Mine for many years for the late company. Will he still dare to deny that the official balance-sheets issued to the shareholders during the final 14½ months showed a loss of 16,525*l.*, and the calls made were 15,820*l.* (the deficiency being met by the 2500*l.* given by Captain Tregay for the property)? Will he deny that the total calls made on the late shareholders were 100,000*l.*, and that while the average price of tin was considerably above what it is now, the whole sum divided over 20 or more years was 1423*l.* 10*s.*?

Under these circumstances I think most people will consider that Capt. Tregay ought to give some satisfactory explanation of the reported profits he is now making for himself, with the disadvantage of a much lower price for this "article of produce." W. X.

April 25.

MINES AND MINING IN GWENNAP.

SIR,—I have sent to you from time to time a few notes respecting the mines in the parish of Gwennap, well known as a celebrated location of mines, most of them formerly very rich, but at present mostly idle. No two mines in the county have yielded so much in dividends as the Consolidated Mines and Tresavean Mine, the first-named having given 600,000*l.* profit, and the latter 450,000*l.* Wheal Unity gave 300,000*l.* profit, Wheal Jewell 300,000*l.*, and several others similar sums. At present the parish may be said to be under a cloud because of the abandonment of many of the mines, and yet few, comparatively, of the dwellings are unoccupied, the miners having either migrated or emigrated, leaving their wives in possession.

Some persons have very gloomy thoughts as to the future of Gwennap, saying its resources are exhausted; others, like myself, think the contrary. There is still a large extent of unexplored ground on the southern side of the parish—from Tresavean to Besson Bridge—in which, doubtless, there are lodes almost entirely undeveloped, but which are likely in the future to draw the attention of speculators. Little has been done on the southern side of Carnmarth, except at Ting Tang, and that mine is said to be worthy of further prosecution.

The mines now at work in the parish are not extensive, but may become so, because they present indications of success. Cathedral (copper), Penstruthal (tin and copper), Comford (tin and copper), South Ale and Cakes (copper, lead, &c.), and West Poldice are of that class. But there is a mine called West Tresavean (late Bell) of superior promise, if I may judge from the parcel of tinstuff (30 tons) lying by the side of a shaft which the miners call "Micheli's shaft." Operations have only recently been commenced here under the present company. Although they have a good tin lode, copper is most likely to become the staple production, the lodes being parallel with Tresavean great copper lode, and having the Tresavean great cross-course passing through the sett.

Penstruthal also, although now yielding tin (about 10 tons per month), is very likely to become a good copper mine. There are numerous lodes in this sett which I mapped in 1829, when I had a favourable impression respecting its character. The old mine—Penstruthal proper—is held by this company, whose manager is the celebrated rich miner, Capt. W. Teague, of Tincroft and other mines. I prognosticate a great extension of works here, and hope to see numerous other mines in the parish set to work, giving employment to thousands of hands. It is remarkable that nearly all the mining districts in Cornwall, except Camborne, exhibit signs of desertion.—*Truro, April 26.* ——— R. SYMONS.

PENNERLEY MINING COMPANY.

SIR,—As the funds of this company are exhausted, and fresh capital is required, instead of issuing preference shares would it not be wiser to offer the property to the Tankerville Company, who own the adjoining mine, for so many of their shares? (I presume they could create additional shares for such a purpose.) To my mind such an arrangement, if the Tankerville shareholders would entertain it, could not fail to be mutually advantageous to both companies. A SHAREHOLDER IN PENNERLEY.

SILVER MINING.

SIR,—I was induced a few years ago to speculate in the mine known as the Queen, which ended in the usual winding-up system. I, therefore, lost my money, put it down as one of the numerous mining swindles, and now to my surprise learn that the mine is a success under the name of Wheal Newton, rich silver ore being daily raised that would put to the blush some of the rich foreign silver mines. Your article, or Report from Cornwall, Mr. Editor, I observe also makes a comment upon the discovery. I have one question to ask—Why was not this found in my time? and I really think the old shareholders in the Queen Mine should have an interest in this same Wheal Newton. It is all very well; I know we can have shares by paying for them, but it is hard for those who, like myself, have no money to spare to see others reaping what we have sown.—*Bristol, April 23.* A QUEEN SHAREHOLDER.

NEW CONSOLS MINE, AND ITS MANAGEMENT.

SIR,—The mode proposed to be adopted for the resuscitation of this mine is, to persons acquainted with practical mining, certainly a most remarkable one. In the first place a committee has been formed which is composed almost entirely of local founders and merchants (who will doubtless have the supplies in their own hands), with an ex-director of the well-known Terras Mine, and an ex-manager of the West of England Chemical Works, so called some little while since. The present manager of the New Consols is located somewhere in the neighbourhood of the Land's End, whose travelling expenses alone would be sufficient to meet the salary of an experienced agent, and, to crown the whole, an amateur miner, with the merest smattering of elementary knowledge in dressing, is now appearing on the scene, who would be sure to involve the company in further harassing embarrassments and disappointments. The most simple and reasonable course to pursue, after the experience gained, surely would be to adopt the sound practical advice given by Mr. Warington Smyth—to sink the mine and to drive levels in the ordinary way in search of discoveries, instead of wasting further capital in extravagant and utterly useless experiments at surface.—*April 23.* ——— OBSERVER.

NEW CONSOLS MINE, AND THE CONCENTRATION OF COPPER ORES.

SIR,—I am a constant reader of the Journal, and a great loser by copper mines, and am much interested in Mr. Barnard's letters which appeared in last week's Journal. Whether right or wrong I am not a competent authority to express an opinion, but it is refreshing to find one of your many correspondents able and willing, to speak out so plainly and to the point, and sign his real name as Mr. Barnard does. It appears that many believe the New Consols is only to be saved by washing and dressing the ores, whereas Mr Barnard distinctly states that this plan will only end in a total wreck of the whole affair. I am led to add my small contribution by reading "Cousin Jack's Unpublished MSS." of the same number, page 433, in which it is stated that some ore washed away gave 17½ per cent., "and wor never seen again in this world;" whereas the stuff saved was only one-half as rich, confirming Mr. Barnard's idea, but perhaps he may himself be the contributor of "The Wild Duck, or Sportsman's Arms" article. If Mr. Barnard can deny this conscientiously, and there is real truth in the statement of "Cousin Jack," I can understand to some extent the cause of my having been so unfortunate in copper mining, and will be the first one to hail Mr. Barnard as a hero, if by any plan he can help me to recover my heavy losses.—*Scarborough, April 24.* C. H.

NEW CONSOLS MINE.

SIR,—In reply to Mr. Simmons, I do not know that anything I wrote should arouse his ire, especially as formerly I made such a "slight impression," and would kindly suggest the second reading of the letter, as what I wrote was an analytical chemist who should be responsible for taking the samples, just as a tin assayer does, which work would then first be treated, and worthless stuff disregarded. Not a word was mentioned about the chemical treatment of ores, and surely with your "thorough technical education" you will at once rectify the mistake, and apologise for replying so uncourteously. I knew there was a chemist on the mine, and knew what salary he received.

The Cornwall Gazette, one of the leading papers of the county, a few months since, in the Mining Intelligence, states that the system inaugurated by the Messrs. Vivian, and still adopted by their successor, Capt. Rich, at South Condurrow, is the best in use in Cornwall. The assayer takes the samples, tries them, and with the weight of the different parcels he makes up the total number of tons of tin, which is sent monthly to the London office, and it then becomes patent to all that if the tin actually sent away did not correspond, the tin dresser would soon be called on to resign. We would say let Mr. Simmons still continue to manipulate, but not let him both analyse and manipulate, as one holding such positions cannot but make the assays to correspond with the actual results for his own honour.

Mr. Simmons: What mean those letters so frequently of late which have appeared in the *Mining Journal* to the effect that too much stuff has been treated (we know that Mr. Barnard has written a letter this week to the contrary); but is it not generally considered that such is the case, and whom does the public hold responsible? Certainly not the tin dresser or agent, as they cannot analyse. Again, who furnished Capt. Pryor with the data on which he founded the statements made at the dinner of the Mining Institute of Cornwall in responding to the toast of "East Cornwall"—"That New Consols was making 1000*l.* a month profit?" Surely such a statement was not the spontaneous outburst of the effect of a "glass of grog," or a fertile imagination. I cannot believe that Capt. Pryor, fallible as he always has been, would give utterance to such an assertion unwarranted, or on the testimony of a stranger. Again, you must have seen the statement, as it was in almost every mining and local paper, and by your silence at the time showed that you concurred with what Capt. Pryor said, or that you lacked the moral courage to tell him such was not the case. I could not tell him it was a misrepresentation—although with others was sceptically inclined—you could: and were such the case your candour and manliness would have reached boiling point in the estimation of the mining public; and you would not have replied to a letter which, to an unprejudiced reader, could not possibly convey any fancied insult.

However, we cannot but reiterate the statement that more than a superficial knowledge of chemistry is required by more than one individual to make New Consols a success. EDWARD SKEWES.

GOLD IN AUSTRALIA.—Count Strzelecki was practically the first discoverer of gold in Australia; and having made his discovery he kept it to himself until such a time as the Government of New South Wales could take precautions for protecting life and property on "diggings" which were certain to become known in a short time. New South Wales at that period was a penal colony, and the number of ticket-of-leave men and escaped prisoners roving through the bush, and more or less settled in the outlying districts, was very considerable. The colonial authorities, forewarned by Count Strzelecki's information, did their utmost to bring into restraint as many convicts as they could lay hold of, and increased the local police in such numbers as to render practically safe the crowds who swarmed into the colony as soon as the news became known. Compared with what had been seen in California a year or two previously, the condition of the Australian gold fields was quiet and orderly. The Order of the Bath was conferred upon the Count for his discovery.

TIN MINING IN AUSTRALIA.—We have been favoured by Mr. James T. Tegg, the manager of the Vegetable Creek Tin Mining Company, with the two half-yearly reports for 1876. The balance-sheets show that the net receipts for tin sold during the year were 48,240*l.* 4*s.*, whilst the total expenditure, including mining and smelting charges, directors and management, freight, insurance, and all other outlays whatever was 23,874*l.* 2*s.* 4*d.*, leaving a clear profit on the year's operations of 24,366*l.* 1*s.* 8*d.* Adding this to the balance of 1813*l.* 11*s.* 1*d.* brought forward from the year 1875, the total undivided profit was 26,180*l.* 5*s.* 9*d.* Of this sum 24,500*l.* was distributed to the shareholders as dividends, which left 1680*l.* 5*s.* 9*d.* to be carried forward to the 1877 profit and loss account. The total cash in hand on December 30, 1876, was 2129*l.* 18*s.* 3*d.*, and the estimated value of ore on the mines and on transit and tin in Sydney was 4500*l.* The directors' reports show that the cost of the working plant, improvements, material, &c., during the year estimated at 3800*l.* has been written off, although the value of the company's property has been increased by that amount. The operations on the mine are now being carried out on a much larger scale. The ore is still forwarded from the mine, *via* Grafton, as well as Brisbane. The area of the company's land is 1260 acres, all of which, as mentioned, has been converted into mineral conditional purchases. In concluding a full report (Dec. 30) upon the various operations at the mines Mr. Alfred Cadell, C.E., the resident director, states that by substituting horse-power for manual labour in taking trucks of wash-dirt from the shafts to the washing appliances some men are dispensed with. Altering the sluicing boxes so that five men now operate upon the same quantity of wash-dirt previously manipulated by nine. Moving tin store and drying furnaces with tramway to within a few yards of washing machinery, by which means a large space over the site of the old tin tramway is made available for the deposit of tailings near the boxes (by this change much saving is effected). Fitting up a puddling machine close to boxes, by which hopperings can be inexpensively reduced, Sinking new ladder-shaft, also timber shaft at No. 1 mine, and many other additions, such as purchasing horses, making drays, &c., necessary for the proper working of the mines. There is every prospect of the company's property remaining very valuable, but he strongly recommends that an adequate provision be made for the further development of the leads now being proved, as the prosperity of the company can better be furthered by such present outlay than by a large distribution of profits which might retard their ultimate progress.

OZOKERIT FOR PRESERVING METALS.—For preserving metal and other substances from decay and fouling, Mr. CHARLES WEIGHTMAN HARRISON, of South Kensington, proposes to dissolve the crystalline hydrocarbon known as ozokerit in any of its solvents, such as benzole, petroleum, oil of turpentine, or resin oil, and he then mixes the solution in any desired proportion with other suitable bodies, according to the purpose for which it is required. He mentions that his experiments have been made with ozokerit as a type of the mineral hydrocarbons, which are built up of molecules, containing not less than 20 atoms of carbon, such minerals being capable of resisting the action of all acids at ordinary temperatures, and suffering no deterioration from atmospheric influences. On this account he has found them valuable for mixing with gums, resins, and colours applicable to a great variety of purposes for preserving, as they impart thereto a high degree of permanence. He explains that a simple and ready mode of preserving bright metals from rust is to rub them over occasionally with a wax formed by melting together equal parts, or nearly so, of ozokerit and beeswax. It is easily applied in a thin coat by rubbing the compound on the metal with a cloth. In applying this compound wax to iron he sometimes adds finely powdered plumbago to give it the colour of the metal. Another compound or solution for preserving metals he forms by dissolving in a sand bath (say) 4 ozs. ozokerit and 4 ozs. marine glue in 2 lbs. benzole, and then adds 4 lbs. linseed oil and ½ lb. essence of turpentine. The mixture is kept gently boiling in the bath for an hour or so, after which it is ready for use, and may be applied to the metal by a soft brush, as in ordinary painting. In some cases he impregnates the surface of the metal deeply by forcing the compound of ozokerit into the pores by exhaustion or pressure, or the two combined. A convenient apparatus, which he uses for this purpose, consists of a metal cylinder, such as a wrought-iron boiler of a suitable size and strength, equal (say) to about 200 lbs. to the square inch, fitted by connections with exhaust and pressure pumps in a manner which is well known. This cylinder is provided with an air-tight door and a safety valve. When the metal articles have been placed in the cylinder the air is exhausted to about 27 inches of mercury, and the hydrocarbon fluid is then admitted through a connecting pipe until the articles to be impregnated are covered. The pressure is then put on, and the fluid forced into the exhausted pores. He also claims painting or coating metals with a compound formed by melting together about 5 lbs. of ozokerit, 5 lbs. of resin, and stirring the fluid in 2 gallons rectified spirit (65° over proof), in which 2 lbs. gum sandarach and 2 lbs. garnet lac have been dissolved. Add turpentine varnish to them, and boil at a gentle heat for an hour or so. Filter through a fine cloth, and preserve for use. He forms a protecting varnish for suspended or open air telegraph wires by coating them with a fluid formed by mixing together, and heating at a low boiling point for a short time, ¼ lb. ozokerit, ¼ lb. gutta percha or india rubber, 1 lb. rectified resin oil, and 2 lbs. linseed oil varnish. As varnish for outdoor ironwork he proposes to dissolve in 2 lbs. tar oil ½ lb. ozokerit and ½ lb. resin, and mixes while hot in an open pot. The invention also includes a process of poisoning barnacles with strong tonic bitters—angostura and the like—or weak strychnine, but these not being of direct interest to manufacturers or miners, they need not be referred to.

SUBSTITUTE FOR WHITE LEAD—PARIS CEMENT WHITE.—The best coating for painting has hitherto been white lead, the manufacture and use of which are so injurious to workmen that Mr. L. Henry, of Paris, has sought a product which, while rendering the same services as white lead, does not present the disadvantages mentioned, and he claims that he has not only attained that object but gone beyond it, as his product is superior to white lead, without taking into account that it is 50 per cent. cheaper, and that with an equal weight he can cover one-third more surface. All cements do not completely destroy humidity or damp, they only isolate it, and little by little the layer of paint is eaten away. The Paris cement white will be found of great service used as a cement, that is to say, applied upon the moist or damp parts as mastic, and the paint placed over it will always preserve its freshness, will not peel off, and there will be no blisters; this part will be as hard as stucco. When executing rich or costly works it will only be necessary to use Mr. Henry's cement as mastic to obtain panels of a brilliant whiteness or marbled, as may be desired, and with a perfect polish. In order that the resistance of the composition may be understood he gives a comparison. It is well known that when it is desired to remove paint from a signboard, for example, the painter is obliged by means of a small apparatus to apply flame to the part first coated in order to remove the white lead; now, his composition resists this firing, thus proving its hardness, and it also resists potassium. The Paris cement white is manufactured like white lead with kneading machines; it is, therefore, delivered in a paste, and when to be used for painting it is dissolved in linseed oil, as is done with white lead; it consists of whiting or Spanish white, baryta, oil, water, and zinc. He does not give the proportions of each product, as they vary with the quality of the said products and their destined use, whether as a mastic cement, for painting, for preserving railway sleepers, for making troughs or tanks water-tight, and the innumerable other purposes to which his composition made of the above-mentioned matters in various proportions may be applied. The invention will be of considerable importance to mines producing barytes, as it will extend the market, whilst it will be of equal interest to consumers,

since they can use the Paris cement white at a low price, instead of paying the price of white lead for a material a large proportion of which consists of baryta.

THE BAZIN DREDGER IN GOLD MINING.

In the *Mining Journal* of Oct. 9, 1875, reference was made to the invention by a Frenchman—Mr. Bazin—of an ingenious arrangement for raising auriferous and other gravel from the beds of rivers. It will be remembered that instead of the buckets usually employed in dredging operations a simple tube was used, the mouth of which was lowered by means of a derrick and pulleys on to the gravel to be removed; and it was pointed out that the raising of the material was in a great measure due to the pressure of the water itself, though in practice a small steam-engine was used to increase the vacuum in the tube. It was stated at the time that the Bazin dredger was first applied for clearing wrecks completely silted up in from 12 to 16 fm. of water in a place exposed to the heavy swell of the Bay of Biscay. The success was so complete that a Parisian company was formed to dredge the Seine for sand for building materials, under license from the patentee, for three contiguous departments. Messrs. Ernest Gouin and Co., of Paris, afterwards secured at a heavy price the rights for the rest of France and sundry foreign countries, and were then successfully dredging at Ponte de Cé, on the Loire, whilst General Sickles purchased the monopoly for the United States. In Russia the dredger had already been employed on important works situated in the Neva, and it was expected that during the succeeding twelve months 37 of the new dredgers would be at work in that country; whilst Mr. Blondel, French Government engineer and ex-chief engineer of the Suez Canal, certified that he was satisfied "that the system is a real solution of the problem of the rapid and cheap dredging of mud and sands." The long period of depression which we have had has prevented the development of the invention in the United Kingdom hitherto; the experimental trials have proved highly satisfactory, and negociations are understood to be pending for large dredging contracts by the holders of the patents in this country.

In the United States, however, the representatives of Gen. Sickles appear to have been more energetic, for Messrs. B. Hedge and J. N. Walker, of Augusta, Maine, have already one of the machines successfully at work in the Feather river, near Oroville. The boat carrying the apparatus is 90 ft. in length and 20 in width. The deck is probably 3 ft. above the surface of the water. On this deck is a house in which the workmen eat and sleep, a 12-horse power steam-engine which hoists and lowers the cylinder by means of pulleys fixed to a common derrick, and a lot of such implements as are needed for everyday use. By the side of the boat, and affixed to its deck, is a common mining flume, 100 ft. in length and 20 in. in width, provided with the same blocks and apparatus for catching gold as any other flume. At the upper end is a pump, worked by steam, that pours a constant stream of 100 in. (miners' measure) of water into the flume. Now, suppose a fire is built and steam got up and the machinery set to work. The first seen is the 100-inch stream of water pouring into the sluice, then the long arm of the derrick lowers until the cylinder hanging from the end of it by a bale rests on the bottom of the river. The quantity of earth taken up is about 300 tons in 10 hours, and it is said that more could be brought up, but no more can be washed in the present sluices with the amount of water used. They have been at work in water running from 6 to 16 ft. in depth. Of course the depth of water makes no difference, only the deeper it is the longer must be the cylinder. Will not the machine revolutionise river mining? There is no longer any need of drying the river; in fact, it can be mined best when the water is in its bed. The gravel is so thoroughly pulverised that all the gold is washed in a very short sluice. Messrs. Hedge and Walker cannot be congratulated upon the manner in which they have altered the original Bazin machine, but it may be presumed that the modifications have been made to meet the prejudices of those who were to employ it, and that the machine once introduced the more efficient arrangement of the original inventor will be gradually returned to. The Bazin dredger is in every respect calculated to perform the work to which Messrs. Hedge and Walker have applied it, and they are certainly entitled to the thanks of the miners of the United States for having been the first to put so useful a machine into practical operation.

THE COAL AND IRON INDUSTRIES OF INDIA.

The following particulars are summarised from some voluminous reports on the coal and iron fields of India. The first systematic and extensive survey was begun five years ago, and the general report submitted by Mr. Banerman in 1873 became the basis of a Minute, in which the Viceroy invited the Governments of Bengal, the North-West, Central provinces, Punjaub, &c., to supply detailed information on the subject. The replies, in some cases supplementing and in others correcting the returns furnished by Mr. Banerman, were published in August, 1874. In November they were followed by a series of extremely interesting minutes and letters from the Chief Commissioner of the Central Provinces, Mr. Hughes, of the Geological Survey, and Mr. Ness, the officer appointed by the Home Government to report on the coal, iron, and limestone of the Wardha Valley. Fresh reports are being received from time to time, and though the subject is far from being exhausted, the question of the possibility of an iron industry is alleged to be beyond dispute. The richest ores are, perhaps, confined to the Wardha Valley, Central Provinces—the Indian Black Country, as some are even now venturing to call it. Mr. Hughes, of the Lohara field, in that district, describes it as "one of the marvels of the Indian mineral world;" while Mr. Ness describes it as "one of the best iron ore fields in the world." Mr. Morris, the Chief Commissioner, adds that "the existence of valuable limestone in the vicinity of both the coal and iron has also been clearly established." Furthermore, the second named officer believes the locality to be capable of producing "more suitable iron for conversion into Bessemer steel than almost any other to which that process has ever been applied." An enormous quantity of the ore lies on the surface, and for the rest the Lohara iron is "practically inexhaustible." The detailed surveys subsequent to that of Mr. Banerman have finally disposed of the "flux" difficulty. Limestone "of excellent quality" and unlimited quantity is obtainable at three leading localities, all within two to six miles of Warora. The Warora coal is as plentiful as the iron. It was in consequence of its fitness for locomotive consumption that the Government authorised the construction of the Wardha Valley Railway, and Mr. Ness claims to have hit on a successful method of converting it into "patent fuel" for his proposed Bessemer Steelworks. The chief disadvantage of Indian coal as compared with the English mineral is its friability, but Mr. Ness maintains that with a judicious system of constructing furnaces and mixing fuel, ore, and lime, "the reduction to the metallic state may be obtained at a much less cost in plant than is at present required in England."

Consider, next, the position of this Indian Black Country of the future. Warora, its coal head-quarters, and the proposed centre of the new iron industry, is the southern terminus of the 46-mile branch line, the northern end of which, Wardha, stands on the Nagpore extension of the Great Indian Peninsula Railway. Situated in the very heart of India, it is thus connected by railway with every portion of its hugh extent. It is also in close proximity to the cotton districts of the Central Provinces and Berar. The cotton mart of Hinganghat stands on the Wardha line, midway between its terminus; and even Bombay itself—the Manchester of the East—is only 18 hours distant by rail. Clearly, there are some grounds for the expectation, so often expressed, that the territory which Sir Richard Temple, Sir George Campbell, and Mr. Morris have been rough-hewing into shape may some day rank as one of the richest in the East.

The next most important mining district in India is that of Raneegunge, on the East India Railway—a short distance from Calcutta—a position the advantages of which are self-evident. First, of its coal. "There is (says the Government Inspector) perhaps no area of similar size in the world which can compare with it for actual thickness of seams." Recent analysis of the Raneegunge coal shows that its average of sulphur is considerably under 1 per cent., the percentage in 11 specimens of good English coal being from ·55 to 1·82, a fact, says the reporter, "which will not readily be credited by those who think that Indian coals are always saturated with iron pyrites." Eight different kinds of the Raneegunge coal are specially classed as adapted for smelting purposes, while 20 others are proved equally fit "for raising steam and for smithy works." There are about 44 mines at work on the Raneegunge fields, but numbers of them are hardly worthy of the name, being merely open quarries worked by hand labour. The better class of works employ steam-engines, of which there are about 60. The coal is beginning to be largely consumed in the public works. The East Indian Railway Company buys large quantities, and Raneegunge coal was almost the sole fuel consumed by the rice steamers employed during the famine of 1874. The ironstone of Raneegunge, says the Government surveyor, probably amounts to "200,000,000 tons for every square mile" of the section. The Bengal Government report of 1873 claimed for this district a rank at least as high as that of the Wardha Valley. Finally, the reports state that abundance of the indispensable limestone is procurable in the Bengalee Black Country likewise. In 1875 the Bengal Ironworks were started on the Raneegunge field; but as yet the iron industry of India has hardly attained to the stage which the Bombay cotton manufacture reached 20 years ago.

Meetings of Public Companies.

LA MANCHE MINING COMPANY OF NEWFOUNDLAND.

The first ordinary general meeting of this company was held at the offices, 9, Union-court, Old Broad-street, on Wednesday, Lieut.-Colonel FIELDEN in the chair.

The SECRETARY read the notice convening the meeting.

The CHAIRMAN, in moving the passing of the directors' accounts, was glad to have the opportunity of making some remarks before the shareholders regarding the antecedents and future prospects of the company. As regards their antecedents they had been singularly unfortunate, not only from shortness of capital, but also from injurious reports which had arisen through local jealousy and other causes. He (the Chairman) was perfectly justified from what he had himself seen of the property during his last visit there, that if the debentures now offered be taken up they will form an amply sufficient capital to make a perfect success, and enable Capt. Nancarrow's estimated output to be realised, and in his opinion doubled, which certainly ought to inspire confidence amongst the shareholders, but nothing short of the amount sought to be obtained (10,000*l.*) would, in his opinion, suffice to bring about the result he had mentioned. As far as he was concerned he had full confidence in the property, which he had practically demonstrated by not only spending 12,000*l.* upon it, for which he held a mortgage, but being also perfectly willing to withdraw that mortgage in favour of the debentures, and rank only as a second mortgage, providing this money can be raised. As regards the accounts there were some small amounts still outstanding, but if these debentures were subscribed for there will not only be ample funds for working but also to pay off all these claims, which could not much exceed 1000*l.*

The SECRETARY, in reply to a SHAREHOLDER, stated that the plant, machinery, &c., on the mine was valued at over 6000*l.*, and the ore already broken, and ready for bringing to surface and dressing, at about 4000*l.* more.

Mr. W. COMPTON SMITH said that he attended the meeting on behalf of Messrs. Richardson and Co., of Swansea, and other shareholders, and that after the full and candid replies he had received to his enquiries, and the information he had elicited, he should feel justified in giving his support to any application to subscribe for the debentures which might be made to those whom he represented.

The accounts were then passed. Mr. Pedder, the retiring director, was re elected, and a cordial vote of thanks to the Chairman, directors, and the secretary, terminated the proceedings.

THARSIS SULPHUR AND COPPER COMPANY.

The general meeting of shareholders was held at Maclean's Hotel, Glasgow, on April 20,—Mr. CHARLES TENNANT presiding.

The CHAIRMAN, in moving the adoption of the report (which appeared in last week's Journal), and the declaration of a dividend at the rate of 20 per cent., said the past year was one of trial in the history of the company, as they had had to face somewhat suddenly very low prices for all their products. He could not help thinking, however, that they had come creditably out of it, strengthened, he hoped, rather than weakened by the ordeal through which they had passed. When he last addressed them he was hopeful that the large depreciation of 2d. per unit in the sulphur value of their pyrites would have been recouped by the improved copper contents of the ore, a return to normal profits on the cementation process at the mines, and increased efficiency and economy in every department. In this anticipation, although the copper contents did not maintain the standard of the first three months, he should not have been disappointed but for one circumstance over which they had no control, but one which had proved a very important one, and that was the fall which had taken place in the price of copper. When he spoke on April 20 last the market was strong, and the opinion prevailed that they were about to see a recovery to something like the average of former years. In this they had been deceived, as the fall had been almost continuous, and amounted to over 5*l.* per ton, which on the quantity of copper they delivered amounted to nearly 45,000*l.* They had had also to meet a large fall in the already low price of purple ore, amounting to 14,500*l.* on the total sales. In the presence of these unlooked-for deficiencies it was matter for congratulation that the gross profit for the year was 255,169*l.* 14s. 8d., or only 22,920*l.* less than in 1875. The operations of the company in all its branches showed satisfactory progress, both technically in the results obtained and economically in the costs of production; and he was glad to say that these improvements had not reached their limit, but that they were going on in the same lines, and trusted that 1877 would show substantial progress in the same direction. He went on to speak of the details of the working of the concern. With reference to their prospects for the current year, he said it had hitherto been his custom to go into considerable detail in connection with that subject. He was inclined, however, to doubt the wisdom of this course, as it led to estimates being formed, and balance-sheets made, which could hardly fail to be misleading, and for which he was held responsiole. He believed, therefore, that he would be consulting their interest, as well as his own feelings, in simply stating that their operations for 1877 would follow very much in the track of those of last year. Their contracts for pyrites were mostly for three years. Their tonnage requirements were well covered at rates as least as favourable as those of last year.

Mr. SCHAW seconded the motion.

Mr. FERGUSON proposed the re-election of the four retiring directors—Messrs. Charles Tennant, Archibald S. Schaw, John Wilson, and Holbrook Gaskell.

Mr. TODD (Peebles) seconded the motion.

Mr. JOHN BROWN, jun., moved the re-election of auditors—Messrs. Alex. Moore, C.A., and Walter Mackenzie, C.A.—and that they receive 150*l.* each for their services for the past year.—Mr. R. S. MUIR seconded the motion.

Mr. JASPER W. JOHNS moved "That the best thanks of the meeting be voted to Mr. Charles Tennant for presiding, and to the directors for the manner in which they have conducted the affairs of the company."

All the motions were carried unanimously and cordially.—The meeting then separated.

SANTA BARBARA GOLD MINING COMPANY.

The annual meeting of shareholders will be held at the offices of the company, Liverpool, on Monday, when the directors' report of the company's proceedings during the year ended Dec. 31, with statement of accounts for the same period, will be submitted:—

Throughout the year the operations at the Pari Mine have been actively prosecuted, and the development of the lode has, on the whole, been satisfactory, an tensive length of the sett being now laid open. The total quantity of mineral raised from the mine during the year 1876 has amounted to 15,928 tons, as compared with 13,624 tons brought to surface in 1875, or an increase of 2304 tons. Of this quantity 3357 tons were rejected at the spalling floors as refuse stone, and 12,571 tons, with 39 tons brought forward from the previous year, together 12,610 tons of ore were treated at the stamping mills, yielding 45,319 ozs. of amalgamated gold, or an average of 3·593 ozs. per ton of mineral stamped, showing an increase in the produce per ton as compared with the previous year of ·283 of an oz.

The net profit for the year is shown in the mine working account as 5801*l.* 4s., after charging the cost of the new stamping mill (No. 5) and other new works, amounting in all to 1287*l.* 0s. 7d., as per balance-sheet, to the capital account. To this sum of £5801 4 0
Has to be added the amount of interest and transfer, &c., fees received ... 119 19 1
And amount received on forfeited shares transferred 18 6 8
And the balance carried forward from previous year 78 18 0

Making a total, at the credit of profit and loss, of... ... ... £6018 7 9

From this amount of 6018*l.* 7s. 9d., an interim dividend of 1s. 3d. per share was paid on Oct. 20, 1876, amounting to 2500*l.*, and from the balance of 3518*l.* 7s. 9d. remaining at the credit of profit and loss the directors recommend that the sum of 500*l.* be carried to reserve fund, 2500*l.* appropriated in payment of a further dividend of 1s. 3d. per share, payable on May 20, making a total division of 2s. 6d. per share, or 25 per cent for 1876, and that the sum of 518*l.* 7s. 9d. be carried forward.

The statistics of the operations at Pari for the year 1876, from the manager, give the particulars of each month's working, and a report from Mr. Hilcke also gives details of the new works executed during the same period. The directors have authorised Mr. Hilcke to purchase some adjoining land, and also the mineral rights appertaining to the Gaspar estate, through a portion of which property the lode now being worked by the company probably extends. The amount required for both of these purchases will be but small.

Owing to the damage occasioned to the water-courses by the severe floods at the mine, and the heavy landslips caused thereby during February, of which the shareholders have already been informed by circular, the company's stamping mills and amalgamation barrels were at a standstill during most part of February, thus preventing the usual returns of gold being made in that month, and delaying the remittances from the mine. By the latest advices it was anticipated that the damage to all the water-courses would be made good towards the end of the month of April.

The directors would refer to the mine captain's report for a summary of the workings on the lode during 1876. The report is accompanied by a plan showing the ground excavated during the 12 months, distinguished by the shaded interval. The report shows that the mine is, on the whole, opening out well below the adit, and the directors trust that an improvement in the size and quality of the lode will take place as the workings attain greater depth. The sinking of No. 1 shaft was suspended on Nov. 1 last at a depth of 21 fms. 2 ft. below the adit, and the ground north of shaft is being stoped away to the place of the projected new sump-shaft.

The new No. 5 stamping mill of 12 heads was completed and set to work on Feb. 1 of the current year, thus giving the company the command of 61 heads of stamps, which should suffice for all its requirements for some time to come, and until the mine is considerably more developed than at present. All the mills are in good order with the exception of No. 3, which, as stated in the last annual report, requires a considerable amount of repair. The directors have forwarded a pulverising machine to the mine for treating the refuse sand, of which there is a considerable stock now on hand, and they trust that the machine will prove a success, and be the means of extracting a fair quantity of gold annually from this refuse sand.

The operations during 1876 have, as in the previous year, been considerably interfered with by want of labour, as alluded to in the last report of the directors, but it is expected that an improvement will henceforth be experienced in this respect. The directors again desire to record their sense of Mr. Hilcke's services in the past year, during which he has successfully administered the affairs of the company with his usual ability. Mr. A. Piggott Fletcher is the retiring director, who, being eligible, offers himself for re election. The auditor, Mr. A. W. Challinor, also retires, but is eligible for re-election.

THE FLAGSTAFF SILVER MINING COMPANY OF UTAH.

The general meeting of shareholders will be held on Monday, when the following report from the directors will be submitted:—

The board herewith present to the shareholders the balance-sheet of the London accounts for the years 1875, 1876, and up to March 31, 1877. With regard to the accounts of the mine, the shareholders will recollect that the last accounts received from America purported to be accounts up to Dec 31, 1874, but these documents appeared of so unsatisfactory a character that the shareholders at the annual general meeting held in July, 1875, very properly declined to adopt them. Since that time Mr. Davis and Mr. Patrick have refused to render any accounts whatever.

The directors regret that the short period they have been in possession of the mine has not afforded time for the preparation of a complete statement of the accounts and position of the company in Utah; but they hope before the day of the general meeting to receive such particulars as will enable them to lay before the shareholders on the 30th inst. a tolerably distinct statement on the subject. They also expect to have by that time a complete map of the mine, exhibiting all the underground developments up to the first of this month.

From a cable received this morning (April 19) the directors learn that 1330 tons of ore had been raised during the 18 days of April, being an output exceeding 70 tons per day, and that rich ore had been discovered in the fifth and third levels. This information the directors regard as very important, indicating considerable improvement in the value and appearance of the mine as it proceeds in depth (the fifth level being the lowest point in the underground workings), while the discovery in the third level assures the continued wealth of the property in a longitudinal direction.

The board take this opportunity of stating that Mr. Davis has commenced an action against the company in the Courts of this country; his object in doing so can only be with the view if possible of embarassing its proceedings, for the Courts of America, before whom this matter has been brought have expressed an opinion that his contracts are void and *ultra vires*, and have granted an injunction restraining him and his agents from in any way interfering with the company or its manager, thus leaving the company in uncontrolled possession of its mine.

How Mr. Davis proposes to obtain from the Courts here an injunction and receiver affecting property in America, and practically overruling the decisions of the Supreme Court of Utah, the directors are at a loss to divine; but they, as well as many others, have always been most anxious for his presence here, and they trust this action will produce that very desirable effect.

Mr. Pearson is the director who retires by rotation, and is eligible for re-election. The auditor, Mr. A. Good, also retires, and offers himself for re-election.

RIO TINTO.—At the ordinary general meeting, on Thursday next, the directors' report and balance-sheet to end of December will be submitted. The accounts show profits on sale of produce from 1873 to 1876, rents in Spain, &c., 157,539*l.* 2s.; and the available cash balances amount to 115,403*l.* 2s. 4d. The directors' report states that the cost of the property has been enhanced by interest on loans, bonds, and shareholders' capital during the 3¾ years of construction. Of this, however, 227,574*l.* 12s. 3d. has been returned to the shareholders as 6 per cent. interest on their shares up to December, 1875. The property has also been charged with the necessarily heavy expenditure during this period of construction; but on the other hand are deducted the profit made on the comparatively small quantity of produce that has been brought to market during the period. The development of the property is proceeding regularly, and the outlay on this head will soon be reduced. Every ton of ore raised is debited with a proper apportionment of this charge to the credit of overburden, so that the balance on this account should gradually diminish. The lode has been laid bare for 830 ft. in length by 250 ft. wide, and 120 ft. deep. This extensive face of ore is being worked in the open from three levels or terraces, and 2500 tons of mineral are daily extracted. The means of communication have been improved, and a regular water supply arranged: 42 new tanks for washing the calcined ore have been erected, now equal to 450,000 tons of raw ore, and corresponding additions have been made to the precipitating tanks. The inexhaustible character of the mineral deposit at Rio Tinto justifies the board in providing on a large scale for the production of copper on the spot, and the new tanks, which are of the most substantial construction, have been so placed as to admit of the greatest convenience and economy in carrying on this process. The quantity of pyrites to be delivered to buyers for the present year amounts to 260,000 tons, and it is intended to raise the calcination to 400,000 tons. The precipitate has averaged over 70 per cent. Both the railway and pier work are well. Labour continues abundant, and the workpeople are industrious and peaceful. The number of hands now employed on the mines is 4500, besides 600 or 700 beasts and seven locomotives. The board regret that small-pox has lately visited Rio Tinto, but every effort has been made by the management and the medical staff to check the evil, which is now rapidly subsiding. Mr. J. Arthur Phillips has been appointed consulting mining engineer in place of the late Mr. David Forbes. He made two visits to the mines last year, and has just gone out again. The board expresses their approbation of the exertions of the general manager, Mr. Mark W. Carr, C.E., and of his staff at the mines in carrying out the wishes of the board, and in developing the resources of the company's property.

CALDBECK FELLS CONSOLIDATED LEAD AND COPPER MINING COMPANY.—The half-yearly general meeting of shareholders was held at the offices of the company Carlisle, on Monday, April 9. There were present—Col. Salkeld (in the chair), Mr. R. B. Brockbank, Mr. Mulcaster (Maryport), Mr. Page, Mr. Ayras (Wetheral); Mr. Calvert (Warwick Bridge), Mr. James Bell (Hayton); Mr. Crosthwaite (Workington), Mr. Gosling, and others; Mr. W. Gath, secretary; and Capt. Polglase, manager. The Secretary read the notice convening the meeting, and the company's seal having been attached to the list of shareholders, the Chairman, in moving the adoption of the report as read by the secretary, regretted that the lessors had driven them into a corner, but trusted that the new discovery would prove successful, and hoped the shareholders would support the new scheme for the future working of the property.—M. R. B. Brockbank seconded the motion, which was carried unanimously; and it was resolved, on the motion of Mr. Brockman, that the scheme for the re-arrangement of the capital submitted by the directors be approved, and the directors be requested to take the necessary steps to carry the same into effect.—Mr. Arras moved that Mr. John Nixon Calvert be elected auditor, in place of Mr. Irving, who had resigned in consequence of ill-health.—Mr. Bell seconded the motion, which was carried unanimously.

For remainder of Meetings see to-day's Journal.]

GAS AND WATER COMPANIES' DIRECTORY.—A very valuable little volume, edited by Mr. CHARLES W. HASTINGS, of Buckingham-street, Adelphi, has just been issued through Messrs. Marcus Ward and Co., of London and Belfast—a Directory of the various gas and water companies, with their officers, and the principal facts as to capital, extent of business, and so on concerning them. The utility of the directory to those connected with the coal trade will be considerable, since it will enable them to determine whether a gas or water company supplies such a population that the business is worth seeking, and if so who are the persons to apply to. The Directory embraces an alphabetical list of towns in England having gas and water companies, date of formation, and character of constitution, amount of capital, names of Chairman, engineer, or manager and secretary, population of the towns supplied, and various other useful information. It is intended in future years to include Scotland, Ireland, and Wales; and as the appearance of the details connected with a company in the Directory is well calculated to bring the officers into communication with those who are best able to supply them with their fuel and raw material at the lowest possible price, it would appear to be to the advantage of all gas and water companies that their officers should furnish the re-

uired information to make the record complete. The Directory ppears to have been prepared with much care, and is well worthy f support.

TALYBONT SILVER-LEAD MINING DISTRICT.

The recent discoveries at Monydd Gorddu and other places have iven a great impetus to mining enterprise in the once busy mining district justly celebrated in former times for the richness of its ilver-lead deposits. Already we hear of new companies to work Esgair-hir, Esgairfraith, Blaen Caelan, Erglodd, and Penpompren, all of which mines are situated on the same run of lodes, those from which Sir Hugh Myddleton, Mr. Bushel, and many others realised large fortunes in bygone years. There are, also, several celebrated mines on the same run of lodes as Monydd Gorddu, which, doubtless, will now be re-opened, and worked with spirit. A great feature in this district not hitherto given that attention which it deserves is that there are a series of north and south lodes crossing the east and west lodes, and at the junctions almost invariably producing deposits of silver-lead more or less extensive; it is ina great measure owing to this fact being overlooked that disappointment and loss often resulted in working mines in this district, the north and south lodes being almost invariably unproductive, except at junctions with cast and west lodes, but being exceptionally productive where such junctions occur. A notable instance of this is to be seen at the Tan-yr-allt Mine, where perhaps some of the finest specimens of silver-lead ore ever seen are now lying at surface taken from the north and south lode for about 20 fms. in length, at a junction of an east and west lode, whilst in no other part of an extensive driving on the same lode is lead to be seen. Another and well-known (east and west) lode is known to be crossing about 20 fms. south of the present workings, and it will be a matter of great interest to see what the result of this junction will be.

This is the same north and south lode which produced such extensive deposits of ore (by crossing east and west lodes) in Allt-y-crib Mine, now called Talybont; and as there is another parallel north and south lode further west, no doubt similar results will reward the enterprise of whoever drives on the course of it to the several junctions, which operation has already been commenced. Again, another exactly parallel north and south lode runs east of both these lodes, and crosses through the Erglodd and Penpompren Mines, through the same east and west lodes as are at Allt-y-crib. There, again, the result has been rich deposits at the junctions, but crosses to the same lode where there are no east and west lodes have only resulted in, as we said before, disappointment and loss. There is equal activity in other parts of the county, but as in no part has there been so much depression for a number of years as in Talybont, which was once one of the principal mining centres, we have for the present confined our remarks to it. It is to be hoped that the general public may be induced to furnish the necessary capital for the unjustly neglected mines of this district, an investment which, if judiciously made, cannot fail to be remunerative.

TIN DRESSING.

The Mining Institute for Cornwall monthly meeting was held, on Tuesday, at the Assembly Rooms, Camborne, when Capt. WILLIAM TEAGUE, jun., of Tincroft and Carn Brea, read a very interesting and practical paper on the question of Tin Dressing. Dr. Le Neve Foster, President of the Institute, occupied the chair, and amongst a large attendance were Capt. W. Teague, sen., Mr. J. L. Bolden, Mr. J. Hocking, jun., Capt. A. James, Mr. W. Pike, Capt. S. Williams, Mr. T. T. Whear, Mr. W. H. Rule, Capt. W. C. Vivian, Capt. Josiah Thomas, Mr. Cox, Capt. Rich, Dr. Butlin, Carter, Lee, J. H. Collins, F.G.S., Capt. Hosking, J. Paul.

Capt. TEAGUE, in his paper, said the subject with which he proposed to deal was neither fresh nor novel, but it was one in which he had always taken a very great interest ever since he had been connected with mining. In his short experience he had seen undoubted progress made in the method of dressing ores, and this improvement was manifest in the present mode when compared with that adopted during his early acquaintance with mining. This was especially so in reference to pulverising, framing, buddling, &c. In these washing departments all miners were aware of a great revolution in the method pursued compared with former times. The hoary institutions of the ancient tinners had been replaced by a far more vigorous system. From the great variety of opinions entertained as to the best method of treating tin, the change in pitch of frame and buddle daily being tried and advocated, and the vast amount of tin which escaped into the river after all their efforts, he inferred that there was yet a great deal to be done. He regarded this department of mining as being as yet in crude a state—at any rate they did not pretend to go in for perfection, and it must be confessed that this part of their work had not received the scientific recognition and attention which most branches of mining had received. They were decidedly behind the scientific advantages which the present age offered; in fact, the very intelligent executive of their mines until recently, bestowed but little attention on the tin floors, compared with the thrift, calculation, and energy bestowed on sinking and driving, or unearthing the mineral, while the tin floors were relegated to the sober method of some advanced individual well up in the rheumatics, but not remarkable in intelligence. Hence, in a great measure, was explained the lagging on the subject of tin dressing. If such individuals had a claim upon the mine he did not hesitate to say that it was better to liberally pension and shelve them than to allow them to stalk about as their tin dressers. To permit this was handing over the *coup de grace* of the battle simply to the maimed and wounded. The washing process seemed to have been an inseparable condition in the treatment of tin at all times, even when it existed in its most pure pure and crystal state. Other processes which they were obliged to adopt in tin dressing in Cornwall were not invariable conditions everywhere in tin dressing—he referred especially to the crushing and calcining. Tin dressing might, therefore, be conveniently divided into three departments - crushing effected by pulverising and stamping, and washing and calcining. Stamping was the same in principle now as that used almost in the earliest historic treatment of tin, though it had gown to a more gigantic scale. But to secure efficiency with their powerful stamping machinery there were two conditions which should have especial attention—the loading for the fly-wheels which could scarcely be made too strong, and the laying of the bed of the stamps firmly with granite, so as to be as unyielding as possible, and the floor of which should be set 2½ in. below the grate. Some people had expressed dissatisfaction that the stamps had not been superseded, but he would remind them that antiquity did not necessarily mean inefficiency. Let them, for instance, take their present "scoop wheel," which was so popular because of its efficiency at the present time. Yet, it was a very old institution, having been used by the Persians for draining land 2000 years ago. The tin having been stamped and passed through the grate the question of treatment from this point became one of importance. Some referred the immediate deposit of the tin into large pits, some into long strips, and others into buddles. For himself, he was in favour of the latter method. Again, there was a difference of opinion as to the kind of buddle to be used. Those prominently in use were Borlase's and the convex, both of which were used on the mines with which he was connected, but he thought the balance of opinion was in favour of the Borlase. At the same time there had been great improvements effected in the convex buddle since its introduction. Its size had varied very much much from the first, it being now greatly enlarged. The head especially, which was at first a mere cone or pivot, had been expanded into a head from 10 to 12 ft. diameter, and this increased size had been found to be a great benefit. As to the next step, through a series of buddling on to the tossing machine, there seemed to be no difference of opinion as to the process of repeated washing preparatory to the tossing machine. He was now going to venture an opinion which might expose him to some criticism from old tin dressers. It was usual for slimes to be lodged in large pits previous to framing or puddling (framing he should say was the best process for slimes). But he never could see the philosophy of this. They had to stir up the deposited slime and get it into the same liquid condition as when it entered the pool before it could be well worked over the frames. This was troublesome, and often they did not get it into that perfect solution as before it entered the pond. Now, if there be no advantage to the slime from resting in the pit a few hours, why not treat it direct from the floors over a series of frames, and to save the expense of pit erection and manual labour of treating, cleaning them, &c.? This question would, he hoped, be ventilated, as he was of opinion that this direct method meant economy. It was not necessary he should say much respecting the next process—that of calcining. They were all agreed as to the virtue of fire in the matter. There are two kinds of calciners—Brunton's and Hocking and Oxland's, both of which he used and found to answer very well. The calcining being complete, and the tin deposited into the wrinkle or recess, he would advise its being allowed to cool down naturally, instead of the ordinary method of louching or throwing cold water on it. By this natural cooling arsenic and other fumes escape, leaving the tin in a brighter and cleaner condition, and they might thereby help to save the after or rag burning. Of course, from this wrinkle the inevitable buddling must go on again, and so on to the tossing and packing machines. The next step was one of diplomacy or transmutation—nothing less than turning tin into gold. There they beat the alchemist, although they seemed to be falling off in this art just now. They did not get the equivalent of gold for tin as formerly; however, in this feat let there be no dallying; prompt action would be the safer course. The question of burnt leavings was also one upon which there was a difference of opinion. He must confess he did not see much propriety in lifting 5 cwts. to crush a needle's point, and so on the mines with which he was concerned they had eschewed the stamps for this purpose, and treated with the pulveriser as being the most expeditious and economical, and he should recommend their use in every burning-house yard, as it would greatly simplify the dressing, and thus save much of the expense which otherwise might be incurred by "chimming" and "delewing." Before he sat down he would submit a suggestion for the treatment of the roughs, the tin in which existed in dradge grains, and could not be profitably dealt with until it was bruised, it being a very large quantity, and could scarcely pay to treat with as a whole. It occurred to him that this bulk could be reduced by being treated with a jigger. Suppose a large tail from the buddle was conveyed by a launder to a cup wheel, by which it might be lifted into a separator, from the separator the slimes would flow over a set of provided frames, and the roughs into the said jigging machines, which should communicate with the stamps. (Applause.)

The CHAIRMAN said he was sure they had all listened with great pleasure to the paper which had been read by Capt. Teague. The subject of tin dressing was one of vast importance, and he hoped the discussion would bring out the idea and opinions of the gentlemen present who had had practical experience in the matter. There was one point to which Capt. Teague had made no reference, and he hoped that gentleman would not consider him too curious if he asked what loss occurred during the process of dressing tin; that was to say, supposing the samples that were tried gave ¼ cwt. to 1 ton of stuff, how much tin out of that was actually lost. Again, Capt. Teague had expressed his opinion that it was best that the stuff should be taken direct from the stamps into the buddles. For himself he should very much like to see the percussion tables tried. He believed it would be quite possible to get a large quantity of tin into whits at one operation instead of turning it over twice or three times. If they could do that there would, of course, be a very considerable saving affected, and he believed it could be done by the use of the percussion tables. In the next place Capt. Teague had referred to the large head in the convex buddle. Those who had visited the mines in the St. Austell district were aware that the tin in Capt. Williams' mines was treated in small buddles which had no head at all, and he should be glad if Capt. Teague would explain why it was that the large head which was so much liked, did, or was supposed to do, better duty than the buddle which had no head. In the St. Austell district the latter worked perfectly well, and Capt. Williams had told him that he did not wish for anything better. With regard to the direct treatment of slimes without settling them in a pit, he could not help thinking that Capt. Teague had hit upon the right course. (Hear, hear, and applause.) It seemed really absurd that they should first settle their slimes and then dilute them again, and he believed that if they were treated directly a vast saving would be effected. He should be glad to have Capt. Teague's opinion as to the merits of the various pulverisers that were in use. (Hear, hear).

Capt. TEAGUE, in reply, said he was strongly in favour of the large head in the buddles for the treatment of the slime tin, because wherever the tin touched it was likely to stick, while with the small head, and large flow of water, a large quantity of the tin would have no chance of adhering at all in the bottom, because of its being in that soluble condition. With regard to the pulverisers, they had four of Dingey's in use at Carn Brea, and they all worked remarkably well, and gave entire satisfaction. At Tincroft they had others at work, which somewhat resembled Dingey's, the difference being that those at Tincroft had only one revolving disc, while those at Carn Brea had four. But all alike worked exceedingly well, and they were very well pleased with them. (Hear, hear.)

Mr. W. H. RULE asked Capt. Teague whether he had ever tried the percentage of tin that lay in the tail of the small round buddles as compared with that in the larger buddles.——Capt. TEAGUE said that would depend to a great extent on the quality of the stuff that was dealt with. If they were dealing with rich stuff there would be tin in the tail of the buddle, but with ordinary stuff, which was comparatively poor, they would not find tin in either the large or small buddles.

Capt. TEAGUE, sen., pointed out that the Chairman's question with regard to waste had not been answered. He believed that upon the working of tin which would produce ¼ cwt. to 1 ton, there was fully a waste of one-eighth. The Chairman had referred to the buddles in the St. Austell district, but they were similar buddles to those that were at work in the Camborne district for the past 15 years, but which fell into disuetude in consequence of their not doing so much work as the larger buddles. (Hear, hear.) He had seen those at St. Austell, and he had nothing to say against them. It might be that the work which they did was of a different class to that done further west. If they went into the far west district they would find that stamps grates were not in use at all; but "flashes" were almost the invariable rule. The flashes had been disused in the Camborne district; one reason for this, and an important one, being that the quantity of stuff which was discharged from the flashes would not compare at all with what could be discharged through the grates. At the same time, he did not mean to say that the West country people were wrong, because the difference in the machinery used might arise from the difference in the stuff dealt with, and these might also account for the success of the buddles used in the St. Austell district. (Hear, hear.)

In answer to a remark from the CHAIRMAN, Mr. J. H. COLLINS said he had seen Williams' buddles at work on some rather rough tin. It went in at an average of from 8 lbs. to 9 lbs. to 1 ton of stuff, but the tails of the buddles never came up to 1½ lb. So much for the small buddles of Mr. Williams. He thought there was a better plan in the case of rough tin. In the St. Austell granite district they used to find that if there was a chance for the rough tin to settle in the heads of certain drags before it got to the buddles, those drags would pay well for scraping.

Capt. TEAGUE, jun.: I should not call that a separation at all.——Mr. COLLINS: It is better stuff than you get down here.——Capt. TEAGUE: I think not. I say if we put stuff into a Borlase's buddle worth 9 lbs. to the ton, the tail of that buddle will not produce any tin until it is bruised.——Mr. COLLINS: And I maintain that you have no tails in the district that are worth less than 3 lbs. of tin to the ton. I will prove it to you at Tincroft, Carn Brea, or any other mine in the district. (Laughter, and applause.)——Capt. TEAGUE: That is not an answer to the question.——Mr. COLLINS: No question has been put to me. (Laughter.)——Capt. TEAGUE: You have spoken of the stuff going into Williams' buddle, which I say is no buddle at all, but only an apology for one. (Laughter.) I should call it nothing more than a pit. I maintain that if you put into our buddle stuff double as good as that which you have mentioned, unless the tail is bruised it will not produce any percentage of tin whatever. (Hear, hear.)——Mr. COLLINS: There I am at an issue with you. I say all your tails will produce 3 lbs. to 1 ton, and some as high as 9 and 10 lbs.——Capt. TEAGUE: Then we have no more cause to be afraid of Australia.——(Hear, hear, and applause.)

Capt. TEAGUE, sen., alluding to a question asked by the Chairman, said he believed the best pulverisers, in point of economical working, were a modification of Stephens'. The Dingey pulveriser was an excellent machine and worked well, but a greater number of the others could be driven with more economy in working power——Capt. A. JAMES thought the question of £ s. d. should not be lost sight of in considering the question of tin dressing, and said he should like to know the average price per ton of tin dressing generally, taking it from the stamps head until it was returned to the smelter. With regard to other points in Capt. Teague's paper he believed that in some cases the buddle was quite as good as the strip. It was, therefore, important they should know what class of stuff they were dealing with, so that they might be able to treat it successfully.

Capt. TEAGUE, in reply, said he did not believe that strips would do in any case at all. Capt. James had asked a question with regard to the charge of dressing, and his own opinion was that those who spent the least amount of money upon tin dressing were the people who were throwing away the most tin. (Hear, hear, and applause.)

Mr. RULE advocated the use of jiggers in the mines, and the CHAIRMAN mentioned that the subject would be discussed at a future meeting of the Institute.

Capt. RICH said it behoved them all to do what they could to prevent their tin from going into the Red River, and he spoke in favour of buddles with the large head, as advocated by Mr. Teague.

In reply to Mr. BUTLIN, Capt. JOSIAH THOMAS said the Frue Vanner was tried at West Seton for a short time. It did its work very well, but it was an expensive machine, and he believed they might just as well let the stuff run into the river as to work it over that machine.

The discussion was continued by Mr. Widdington, Mr. Hocking, Capt. Charles Thomas, and Mr. B. Kitto, after which a vote of thanks was given to Capt. Teague for his paper, and to the Chairman for presiding.— *Western Daily Mercury.*

TIN AND TERNE PLATES.—The invention of Mr. R. J. HUTCHINGS, of Treforest, South Wales, consists in causing the metal plates to be coated to be passed through a pot or pots or suitable vessel containing palm oil, grease, oil, or flux by means of rolls or rollers covered with felt or other suitable material to cause the plates to be thoroughly painted with the oil, grease, or flux; afterwards they are carried through the metal bath or baths automatically by means of endless chain, chains, travelling carriage, carriages, frames, rollers, sheaves, or other suitable mechanism, afterwards finished in grease, oil, or flux, by means of rolls or other suitable mechanism at end of said metal pot, or may not be finished in same pot. Guides and cradles may or may not be employed; also wash pot and brushing may or may not be used as found advisable. He does not confine himself to any number or shape of pot or pots. Covers may or may not be used.

FINISHING ROLLS FOR ROLLING METAL.—A method of finishing the ends of rolls by mechanical means, instead of by hand labour, has been invented by Mr. F. R. WHEELDON, of Wolverhampton. The roll having been placed in position is operated on by a contrivance which he calls a wabbler cutting machine, by means of which the grooves are cut out of the ends of the roll, and which consists substantially in a horizontal boring bar or hollow spindle sliding freely endways through a hollow bush supported in a carriage or plummer block in which it turns. A series of spur wheels are provided, the largest of which is keyed upon the hollow bush before mentioned, and through which the boring-bar or spindle slides. This said bar or spindle has a groove running in a longitudinal direction, and a key is fixed in the said hollow bush, so that the bar is compelled to turn with the bush, although the said bar is free to slide endways. A set of self-acting wheels for giving motion to a screw are now provided, and are fixed inside the hollow spinle before mentioned; these are for giving an endway motion to the said bar or spindle, the screw working through a fixed nut or bush in a hollow bush provided. A boring-head is fitted into the said hollow spindle, and is armed with a series of steel cutters for cutting out the flutes in the wabbler. The wheels and pinions are caused to revolve by means of fast and loose driving pulleys. Carriages are provided for holding the roll whilst being operated upon, the roll being supported at each end by a V-shaped block, this said block being raised to any required height by means of screw slings, which support a carrying-bar passing under the V-shaped blocks. When the fluting head is not in use, and it is desired to face or turn the ends and sides of the wabbler, a cutting-box is fixed on the end of the spindle or boring-bar, and the operation is carried into effect by fixing a plate containing any desired number of steel cutters for surfacing the outside of the wabblers; and in the interior of the box is fitted a second plate carrying steel cutters for facing the ends of the roll wabblers, this second plate being fixed at the same distance from the front cutters as the length of the wabbler, so that when the cutters of the front plate reach the shoulder at the junction of the neck and wabbler the steel cutters of the second plate come into operation at the same moment for facing the end of the wabbler.

THE SCOTCH MINING SHARE MARKET—WEEKLY REPORT AND LIST OF PRICES.

During the past week the market has been inactive. The settlement intervening helped to limit transactions. The new account for settlement May 16 opened on Wednesday, and Saturday, May 12, will be next contango-day. Particulars of the continuation business done at this settlement will be found below. In shares of iron and coal concerns the tendency of prices is very unfavourable. Lochore and Capeldrae have fallen 15s. per share, and Bolckow, Vaughan, A, 10s., but sellers of Ebbw Vale ask an improvement of 10s. without business resulting. Cairntable and Benhar are quite unchanged. Richards and Co. declare a dividend of 10 per cent. per annum for the half-year ending March 31 last, which is the same as at this time last year. Andrew Knowles and Sons are at 5s. premium. Bolckow, Vaughan, B, 34½. Chillington, 65s. to 75s. Darlington, 10 dis. Oakham (25*l.* paid), 62s. 6d. Sheepbridge, 85s. dis.; ditto new, 9½. Staveley, A, 27½ prem.; and ditto, C, 87½.

In shares of foreign copper concerns Tharsis are now quoted ex div, and rather higher. Rio Tinto 5 per cents. are reduced as much as 90s.; ditto, 70 per cents., 15s.; and Huntington, 1s. Nothing doing in Kapunda. In shares of home mines little doing. Glasgow Caradon (old) are raised 6d. The last sale of copper ore by the Glasgow Caradon Company—240 tons—on the 19th inst., realised 1014*l.* 0s. 6d., or an average of 84s. 6d. per ton. Last month 240 tons realised fully 89s. 8d. per ton, while in the corresponding month of 1876 240 tons averaged 105s. 9d.; of 1875, 260 tons averaged 100s. 7d.; and of 1874, 250 tons averaged 91s. 10d. Aberdaunant are wanted, at 11s. 3d. Bamfylde, 5s. to 10s.; Killifreth, 16s. 3d.; Great Laxey, 20⅜; Gunnislake (Clitters), 40s.; Leadhills, 6¼; Marke Valley, 19s.; Parys Mountain, 5s. to 7s. 6d; Prince of Wales, 3s. 9d.; South Condurrow, 7½ to 7¾; West Maria, 1s. to 2s.; West Mary Ann, 18s. 9d.; West Tresavean, 18s. 9d.; Wheal Agar, 70s; Wheal Uny, 35s. In shares of gold and silver mines Richmonds have advanced 6s. 3d.; the week's run is $30,000. The Santa Barbara report for the past year shows an available balance of 6018*l.*, out of which a further dividend of 1s. 3d. per share is recommended, making 2s. 6d., or 25 per cent. for the year. After adding 500*l.* to the reserve fund there will remain 518*l.* to be carried forward. Chicago are now at 83s. 9d.; Eberhardt, 8; Frontino, 35s.; St. John del Rey, 280.

In shares of oil concerns Young's Paraffin have risen 10s., also Oakbank and Uphall each 2s. 6d. The balance-sheet of the Oakbank Company, though not yet audited, shows a net available profit for the year ending March 28 last of 17,219*l.* 4s., after providing for maintenance and writing off the usual 10 per cent. depreciation from plant and property accounts. The directors propose to pay a dividend of 25 per cent., which will leave 5969*l.* 4s. to be added to the reserve funds. In shares of miscellaneous companies there is an improvement of 2s. 6d. on Scottish Wagon (old); others unaltered. Milner's Safe are at 9½ to 9¾; Phospho Guano, 10½. In shares of chemical companies, Langdale's are at 75s. to 80s.; Lawe's, 7½; and Newcastle, 62s. 6d.

On contango day (Tuesday, April 24) the following were the rates of continuation current:—Contangos: 2d., 1¼d. on Canadian Pyrites; 1¼d., 1½d., on Glasgow Caradon; 1d. on Port Washington; 1d., ½d. on Huntington; 3d. on Marbella; 1d. on Oakbank; ½d. on ditto (new); even 3d. on Richmond; 4½d. on Uphall; 6d., 3d. on Young's Paraffin. —Even: Monkland Iron; Tharsis (new).—Backwardations: even, 6d., 9d., 1s., 1s. 3d., 1s. 6d. on Tharsis. On comparing the making-up prices fixed to-day with those of the previous occasion for the undermentioned shares, fluctuations as under are shown for the account. Richmond (at 6⅝) have advanced 18s. 9d. per share, Tharsis 7s. 6d., Young's Paraffin 5s., Huntington 3s., Tharsis (new) 2s. 6d., and Oakbank Oil 2s. On the other hand, Uphall Oil have fallen 5s., Omoa and Cleland 2s. 6d., also Glasgow Caradon (old) 6d. Canadian Pyrites, Emma, Port Washington, Marbella, Monkland, ditto (pref.), and Oakbank (new) show no alteration.

OAKBANK OIL COMPANY (Limited).—The balance-sheet of this company, though not yet audited, shows a net available profit for the year ending March 28, 1877, of 17,219*l.* 4s., after providing for maintenance and writing off the usual 10 per cent. depreciation from plant and property accounts, and the directors will propose to the shareholders to pay a dividend of 25 per cent., absorbing 11,250*l.*, and leaving 5969*l.* 4s. to be added to the reserve funds of the company.

Subjoined are this week's quotations, &c., of mining and metal shares quoted on the Scotch Stock Exchanges:—

Capital. Per share.	Paid up.	Dividends. Rate per cent. per annum. Previous.	Last.	Description of shares.	Last price.
				COAL, IRON, STEEL.	
£10	£7	£ 8½	£ 8½	Arniston Coal (Limited)	8¼
10	10	6	6	Benhar Coal (Limited)	9⅜
10	8	6	6	Ditto	6¾
100	45	18s9d†	41s6d†	Bolckow, Vaughan, and Co. (Lim.)	A. 49¾
100	10	10	10	Cairntable Gas Coal (Limited)	8
10	10	nil	—	Chillington Iron (Limited)	80s.
32	29	nil	nil	Ebbw Vale Steel, Iron, and Coal (Lim.)	7½
10	5	nil	nil	Fife Coal (Limited)	40s.
10	10	nil	nil	Glasgow Port Washington Iron & Coal (L)	50s.
10	10	—	—	Ditto Prepaid	50s.
10	10	—	—	Lochore and Capledrae (Limited)	80s.
10	10	nil	3	Marbella Iron Ore (Limited)	74s.
10	10	nil	nil	Monkland Iron and Coal (Limited)	53s.
10	10	5	4	Ditto Guaranteed Preference	5
100	100	nil	nil	Nant-y-Glo & Blaina Ironworks pref. (L)	21½
6	5½	nil	nil	Omoa and Cleland Iron and Coal (Lim.)	26s. 6d.
1	1	15	17½	Scottish Australian Mining (Limited)	40s.
1	5s.	15	17½	Ditto New	10s.
Stock	100	5	nil	Shotts Iron	97
				COPPER, SULPHUR, TIN.	
4	4	—	—	Canadian Copper Pyrites (Limited)	18s.
10	7	20s	20s	Cape Copper (Limited)	40
1	1	15	7½	Glasgow Caradon Copper Mining (Lim.)	25s.
1	15s.	15	7½	Ditto New	16s. 6d.
10	9¼	nil	nil	Huntington Copper and Sulphur (Lim.)	30s.
25s.	25s.	—	—	Kapunda Mining (Limited)	6d.
4	4	—	—	Panuelillo Copper (Limited)	25s.
10	10	nil	nil	Rio Tinto (Limited)	87s. 6d.
20	20	—	7	Ditto, 7 per cent. Mortgage Bonds	14½
100	100	—	5	Do., 5 p.ct. Mor. Deb. (Sp. Con. Bds.)	59½
10	10	nil	nil	Russian Copper (Limited)	40s.
10	10	25	22½	Tharsis Copper and Sulphur (Limited)	22/11s3d
10	7	25	22½	Ditto New	15
1	1	—	—	Yorke Peninsula Mining (Limited)	7s. 6d.
1	1	—	—	Ditto, 15 per cent. Guaranteed Pref.	21s. 3d.
				GOLD, SILVER.	
1	1	—	—	Australian Mines Investment (Limited)	8s. 9d.
20	20	nil	nil	Emma Silver Mining (Limited)	8s. 9d.
10	10	—	—	Flagstaff Silver Mining (Limited)	50s.
5	5	—	—	Last Chance Silver Mining (Limited)	10s.
5	5	7s. 6d†	7s. 6d†	Richmond Mining (Limited)	6¼
				OIL.	
10	7	5	6	Dalmeny Oil (Limited)	8⅛
1	1	—	7½	Oakbank Oil (Limited)	55s.
1	5s.	—	7½	Ditto	13s. 6d.
10	10	—	2½	Uphall Mineral Oil (Limited) "A"	9½
10	10	—	—	Ditto "B" Deferred	10
10	8½	5	9	Young's Paraffin Light & Mineral Oil (L)	14/18s9d
				MISCELLANEOUS.	
50	25	10	5	London and Glasgow Engineering & Iron Shipbuilding (Limited)	26⅜
20	14½	—	—	Peruvian Nitrate (Limited)	10½
10	10	6	6	Scottish Wagon (Limited)	11⅜
10	4	6	6	Ditto New	87s. 6d.

† Interim. ‖ Per share.

Last day for this account, May 12; settling day, May 16.

NOTE.—The above lists of mines and auxiliary associations are as full as can be ascertained, Scotch companies only being inserted, or those in which Scotch investors are interested. In the event of any being omitted, and parties desiring a quotation for them and such information as can be ascertained from time to time

to be inserted in these lists, they will be good enough to communicate the name of the company, with any other particulars as full as possible.

J. GRANT MACLEAN, Stock and Share Broker.

Post Office Buildings, Stirling, April 26.

FURNACES FOR ROASTING ORES.

An improved arrangement of furnace for roasting ores has been invented by Mr. H. HERRENSCHMIDT, of Melbourne, Victoria, the leading features of which consists in making the roasting or purifying chamber of conical or taper form, in dividing the chamber longitudinally, in making the fire-place and the receiver for the roasted ore movable, and in providing the movable fire-place with a chamber above it for the generation of hydrogen gas when required. The roasting chamber is set horizontally, the feed being at the smaller end, and the discharge at the larger end. The fire-place is at the latter end, and the chimney stack at the former end. In a 40-ft. chamber the larger end should be about 2 ft. more in diameter than the smaller end. The said chamber revolves on friction rollers supported on suitable piers. The material is fed through an inclined shoot, around the mouth of which is a cast-iron plate working against a ring on the inner periphery of the chamber to prevent the material falling backward instead of forward. Allowance must be made in the brickwork for the expansion of the iron chamber by heat. The said chamber may be divided into two or more longitudinal compartments, and the outer casing may be triangular, square, or polygonal. Passages are provided for the admission of air to either the upper or lower half of the said chamber. When the material requires to be treated with hydrogen gas the divisions must extend the whole length of the chamber, and terminate in separate ascending flues. The fire-place is carried on wheels running on rails to admit of its easy removal in the event of its becoming necessary to obtain access to the body of the roasting chamber, or to substitute one with a hydrogen gas generator for a fire-place without one, or *vice versa*. The roasted ore receptacle being made movable as described, gives great facility for the removal of the ore treated. The revolving motion is very slow—say, one revolution in five minutes—and it may be either continuous or intermittent, the object being to subject the material under treatment to the action of heat and atmospheric air, or heat and hydrogen gas alternately.

In operating the apparatus the material to be treated is supplied through a feeding shoot, the atmospheric air holes are opened, and the fire is lighted in the fire-place. The roasting chamber is then slowly revolved at a regular speed, or by a constant succession of partial revolutions, or it may vary in speed during each revolution, moving very slowly, so long as the compartments are fairly exposed to the action of the heat, atmosphere, or hydrogen, as the case may be, and travelling much quicker when moving from one position to the other, or it may stop altogether whilst being thus exposed so as to make it an intermittent motion. When the material reaches the commencement of the longitudinal divisions it distributes itself between the two compartments, part entering one half and part entering the other half of the chamber, each half being alternately the upper and lower one respectively. Whichever is the lower one has its contents exposed to the action of the atmosphere. During the process of revolution, however, both compartments are at times exposed to the heat of the furnace. When treating sulphurets, which are difficult to roast and easy to smelt, such as antimony sulphurets, he uses a fire-place with hydrogen gas generator. He produces the gas by means of steam admitted into a retort containing iron, the result of which is (as is well known) the retention of the oxygen of the steam by the iron, and the setting free of of the hydrogen. This is then conducted into the upper half of the revolving roasting chamber, the atmospheric air entrances having been previously closed. It is obvious that the hydrogen might be conducted into the lower compartment if so desired by altering the arrangement of the fire-place. In the event of triangular or polygonal roasting chambers being used he would provide them with a circular framing to support them, and from which to impart the necessary motion.

TREATING SODIUM AND POTASH SALTS.

A series of interesting inventions connected with the treatment of salts of sodium and potassium have been patented by Mr. WALTER WELDON, of Abbey Lodge, Merton. It has been many times proposed, and, although less frequently, it has been many times attempted to manufacture soda by converting sulphate of soda into sulphide of sodium, and then decomposing such sulphide of sodium by carbonic acid or other suitable agent. This method of manufacturing soda would permit the recovery and re-utilisation of the whole of the sulphur contained in the sulphate of soda employed, and would avoid the production of the offensive residue known as alkali waste; but all attempts to practically apply this method have hitherto failed.

A principal cause of this failure has been the very powerfully corrosive action of sulphide of sodium upon the materials of which all furnaces or other apparatus for the manufacture of that body have hitherto been constructed. The manufacture of sulphide of sodium has usually been attempted by heating a mixture of sulphate of soda with coal, coke, or other form of carbonaceous matter in furnaces or other apparatus constructed either of brick or of cast-iron. Sulphide of sodium, however, attacks both these materials with such energy that the furnaces or other apparatus employed have been rendered useless after a very few operations, while the product obtained instead of being pure sulphide of sodium has consisted in very large part of the bodies which are formed by the reaction of sulphide of sodium upon brick or iron, as the case might be.

The principal object of Mr. Weldon's present invention is to provide apparatus for the manufacture of sulphide of sodium, which shall not be liable to corrosion thereby, and which shall thus permit the production of sulphide of sodium much more economically than it has ever been produced hitherto, and at the same time of such purity as to be practically a new product. For this purpose he lines with gas retort graphite or with artificially agglomerated and compressed coke, or other form of carbon, the furnaces or other apparatus to be used for the manufacture of sulphide of sodium, or of sulphide of potassium, and also the vessels into which the sulphide of sodium or sulphide of potassium is discharged therefrom in a fused state; and, secondly, he uses for the manufacture of sulphide of sodium and sulphide of potassium of a revolving furnace lined with carbon, as described, and also of a revolving furnace so disposed as to be capable of being converted at will into a vessel closed at one end.

The next invention relates to the conversion of sulphide of sodium and sulphide of potassium into carbonate of soda and carbonate of potash by means of gaseous carbonic acid, and to the first part of the treatment of the resulting sulphuretted hydrogen for the obtainment of free sulphur therefrom by the method patented by Mr. Weldon in 1871. It will be convenient in what follows to speak only of sulphide of sodium and carbonate of soda, but all that is said of these will be equally applicable to sulphide of potassium and carbonate of potash. In treating sulphide of sodium by carbonic acid gas in the wet way under this invention he partially fills with solution of the sulphide a series of vessels, which he calls absorbers. These absorbers must be constructed of a material which is not seriously attacked either by an alkaline sulphide or by sulphuretted hydrogen. He prefers to construct them either of stone, or of wood lined with lead. They are all closed vessels, perfectly gas-tight. Each of them is furnished with a mechanical agitator, preferably so disposed as to revolve on an axis placed horizontally, and to be capable, when the vessel is partially filled with the solution to be treated by the carbonic acid, and the agitator is put in motion, of keeping the upper part of the vessel constantly filled with such solution in the state of fine spray. The essential feature of the invention is the peculiar method of working for effecting the decomposition of sulphide of sodium and sulphide of potassium by carbonic acid gas in the wet way, and for the absorption of the resulting sulphuretted hydrogen by a metallic oxide mixed with or suspended in water, and the use for these purposes of apparatus disposed and arranged in a special manner

Another of Mr. Weldon's inventions consists in heating the sulphate of soda and the carbonaceous matter separately, before mixing them together, so that when they are afterwards brought into mutual contact reaction can take place between them without any further, or with but little further, application of heat. For carrying into effect this new method of applying heat necessary to enable sulphate of soda and carbonaceous matter to react upon each other he does not confine himself to the use of any particular kind or kinds of furnaces, or of any particular combination of furnaces, but he prefers that the furnace in which the sulphate of soda is heated should be a Siemens regenerative furnace, and that the furnace in which the carbonaceous matter is heated should be that in which it is afterwards to re-act on the sulphate of soda. In such case the latter furnace, of whatever kind it may be, otherwise should be protected from corrosion by the sulphide of sodium to be produced in it by being lined interiorly with blocks, either of artificially agglomerated coke, or some other convenient form of solid carbon. In the former furnace he heat sulphate of soda at least to fusion; in the latter furnace he heats powdered coke or charcoal preferably to redness. If the fused sulphate of soda from the one furnace be now run on to the red-hot coke or charcoal in the other furnace, sulphide of sodium will be produced much more advantageously than by any method hitherto employed. As much of the invention as relates to the first heating sulphate of soda to fusion in one furnace. and then running it in the fused state into another furnace to be there decomposed, is applicable also to the manufacture of what is known to alkali makers as black ash.

On the same day Mr. Weldon also patented an invention which consists in means of avoiding the prohibitory cost and the fatal impurity of sulphide of sodium as hitherto obtained, of thus manufacturing sulphide of sodium economically, and of such purity as to be practically a new product, capable of conversion into merchantable soda by simpler and cheaper means than any hitherto practicable, and than any hitherto proposed, and of obtaining at the same time a gaseous product, consisting of nearly pure and undiluted carbonic acid, perfectly available for the subsequent conversion of the sulphide into carbonate. He employs a suitably lined revolving furnace. To avoid the evils which result from the access into or passage through the vessel in which sulphide of sodium is being produced of either air or products of combustion, he heats the sulphate of soda and the carbonaceous matter separately in distinct furnaces, and then mixes them together only after they have separately been raised to such a temperature or temperatures as shall permit of the reaction between them taking place without any further application of heat. He is thus enabled to effect the reaction between them in a vessel into which neither air nor products of combustion can enter while the reaction is going on, and which for the time being has no other opening than such as is necessary for the escape of the gaseous product of the reaction. He thus not only obtains a purer sulphide than has ever hitherto been produced, but obtains at the same time practically pure carbonic acid, by means of which the sulphide can afterwards be decomposed.

RAISING AND PREPARING COAL FOR MARKET.

Among recent inventions connected with colliery operations may be mentioned that of Mr. PORTER SHELDON, of Jamestown, Chautauqua, New York, which consists in a tapering rotary cutter formed with double plain or grooved faces, the adjacent curved faces sometimes having wedge-shape grooves for the reception of the cutter, the combination of the winding drum, and a counter shaft of spur wheels, endless chains, a double clutch to impart slow or rapid movement to the machine, and in certain other modifications in detail. The side rail of the machine is provided with means for adjusting the axles relative thereto. The side rails are formed with rectangular slots or bearings, within which the ends of the rear axle are secured. Adjusting screws squared at their upper ends for the application of a wrench pass through the side rails, and are firmly attached to the ends of the rear axle. By turning the adjusting screws the position of the frame carrying the revolving cutter may be adjusted as desired. To the forward cross-bar of the machine the forward axle is pivotted at its centre, so that the wheels passing over an uneven surface may yield and support the machine in any position. Oscillating engines having their trunnions suitably journaled in bearing blocks impart a rotary motion to the double crank shaft through pistons. Eccentrics are secured to opposite ends of the crank shaft, and to each eccentric straps and connecting rods are attached, while the opposite ends of the connecting rods are attached to the cranks of oscillating valves that serve to govern the entrance and exit of motive-power to the engines. To the double crank shaft, and between bearing blocks, the main driving gear wheel is rigidly secured, and meshes with the cog-wheel of the counter shaft. The outer end of the counter shaft is screw-threaded for the attachment of the rotary cutter bar, which is formed tapering from its inner end to its point, and has plain faces. The form of the cutter is such that its strength is gradually increased with the leverage, and its weight decreased from its outer to its inner end, whereby the springing of the cutter bar is in a great measure obviated, and also through the medium of the cut away or plain faces the cutter bar readily clears itself of the coal cuttings accumulating in the cut in front of the same. The rounded faces of the cutter bar are provided with wedge-shaped grooves, within which the cutters are firmly secured. Pipes are attached to the outer trunnions of the oscillating engines through stuffing boxes, or in any desired manner, and these pipes connect with a rear cross pipe, which is curved downward and screw-threaded at its outer end. A tapering pipe having air-jets or nozzles is screwed on the end of the pipe. The engines are actuated by compressed air, and the exhaust is carried through pipes, whence it escapes through jets, and serves to force the coal cuttings from about the rotary cutter, and allow the same to work without any obstruction from the constantly accumulating coal cuttings.

In order that the cutter may cut closely to the floor of the gallery, Mr. Sheldon uses but a single or outside guiding track for the machine, and provides the machine with double flanged track wheels and plain or road wheels on the inner or cutting side of the machine. As the cutter shaft is not obstructed by any track, but on the contrary moves near the floor of the gallery, the cutting bar will cut the breast of coal close to or even with the floor, thereby saving the time and expense usually incurred in cutting away a layer of coal above the floor that heretofore has been left standing by the coal mining machines as heretofore constructed. As heretofore stated, the cutter bar may be vertically adjusted by turning the set screws, as they serve to vary the height of the frame from the road wheels. Upon the crank shaft the worm gear is rigidly secured between the crank and central bearing block. The worm gear meshes with a cog-wheel on a longitudinal shaft, the same having end bearings in the front, and rear cross bars of the same. Upon the forward end of shaft the bevel gear wheel is secured, the same meshing with bevel gear wheel of the transverse shaft. The end of the shaft carries two loosely-journaled spur wheels, and between these loose pulleys the double sliding clutch is secured to the shaft by a spline and grooved. The double clutch is formed with a central groove, within which engages the end of a shifting bar provided with a slot, and attached to the frame by a screw or bolt. An operating lever is pivotted at its lower end to the frame of the machine, and passes through an opening in the end of the shifting bar. Endless chains pass around the spur wheels of the shaft, and impart rotary motion to the winding drum through the large and small spur wheels, which are rigidly secured to the axle of the drum; a rope is secured to the drum, and the opposite end of the rope is secured to some fixed object in the gallery of the mine. When it is desired to feed the rotary cutter forward rapidly against the coal, the clutch is thrown in contact with the inner spur wheel, and as the endless chain on the same passes around the small spur wheel attached to the axle of the drum, the latter will be rapidly revolved, and through the rope attachment winding on the drum cause the machine to be drawn rapidly against the breast of coal. A slow motion is obtained by shifting the clutch and causing it to engage with the outer pulley, the belt or chain of which passes around the large spur wheel of the drum. To stop the machine the clutch is thrown midway between the loose spur wheels, when the drum will remain stationary.

The importance of attending to the proper lubrication of the axles of colliery trams was pointed out at one of meetings of the Iron and Steel Institute, and Mr. W. H. LLEWELLYN, of the Rhondda Engine-Works, Pentre, has now patented an invention, according to which he proposes in the construction of the wheel to cast it with an oil chamber surrounding the nave or boss, the core from which chamber after casting he removes through two or more openings cast in the outer wall of the chamber, from which the arms radiate. These openings are subsequently fitted up with closing pieces leaded securely in position, so as to enclose the said oil chamber into which the oil or lubricant is introduced, so as to fill it through one of the said closing pieces, which is troughed and shaped on its inner side in such manner as to hold a short piece of india-rubber tubing, which closes a hole in the bottom of the trough through which the oil is introduced into the chamber, the oil can depressing the rubber expanding and closing the hole upon the can being withdrawn, and preventing the exit of the oil. The lubricant or oil obtains access to the shaft or axle, and between it and the boss of the wheel through one or more orifices cast in the boss, and in which headed needles work up and down by the travelling motion of the wheel, and prevent the thickening of the oil; this may also be effected by sponges placed in these orifices. The oil passes therefrom into the chamber, which is cast in the boss in its inner periphery, and surrounds the shaft or axle.

For preventing the breakage of coals when delivering them from colliery screens into wagons, Mr. A. M. POTTER, of Heaton, near Newcastle-on-Tyne, has found the apparatus most advantageous to employ to be an iron tray, slightly longer than the width of the ordinary colliery screen, and about 30 in. wide, having a ledge round the back and each side. This tray is hung by two chains immediately under the flat part of the screen working over the pulleys, and balanced by two weights working in guides, which are heavier than the tray. The back chain is attached to the tray by two iron rods, which work in guides at each side of the end of the screen. In the sides there are a number of holes about 6 in. apart, in which pins are placed equidistant from the tray to regulate its descent. The two balance weights are held down by a weighted lever until the weight of coal on the tray is heavier than the lever and weights, when the tray descends and the weights rise, and thus disengage themselves from the lever. When the tray reaches the required depth the back chain is checked by the pins striking the low guides, which causes all the coal to slide off the tray, thus depositing it without any fall into the wagon; the tray then being empty, the weights bring it back to its original position, and at same time fall below the lever, thus rendering the whole apparatus ready for work again.

SLAG BLOCKS FOR TRAMWAYS.

It is well known that the slag of iron is an abundant but waste, or comparatively waste, product of smelting and other operations, and that even when run into blocks or forms in the ordinary manner its brittle character has rendered it almost inapplicable to any useful purpose. The object of the invention of Messrs. BOLTON, BEAUMONT, and ASHWELL, of Westminster, is to render it available as building blocks or bricks by so treating it in the casting process as to reduce the actual brittleness of the castings produced, and by so forming, adapting, and applying these as in degree to neutralise or overcome this objectionable quality. To reduce the actual brittleness of castings produced from slag the moulds must be heated, and this heating of the moulds, and very gradual cooling and annealing, has already been practised with some success. One feature of the present invention bears on this process. They sling the mould or moulds for the blocks from any convenient support, so that all contact with the bottom or sides of the foundry pit shall be avoided, and so that on pouring the molten or fluid slag into the pit it may rise freely under and around the moulds, and heat them equally and uniformly before it enters the interiors by or through orifices at or near the tops of the moulds provided for the purpose. Sometimes instead of slinging the moulds within the pit they first fill the pit, and then slowly lower or dip the moulds into the fluid mass, which as the moulds sink will properly heat them without admitting the fluid to the interiors until the necks or openings are permitted to sink below the surface. After an interval the moulds may be withdrawn and the slag castings placed in a closed chamber to cool gradually. Other moulds are treated in succession in the same manner in the same pit, which if desired may have a furnace beneath it for sustaining a constant heat. The moulds may likewise be heated by a current or blast of air, or by any other suitable means.

Selecting, as an example, the employment of blocks of slag for the formation of a tramway, the inventors explain that they mould and cast them so as to admit of the application to them of any convenient form of rail and sleeper; and they also cast recesses in their sides so as to permit the paving blocks or materials of the general roadway to project into and break joint with the specially formed blocks which constitute the tramway; they also cast them so as to admit of the application to them of longitudinal stringers, or plates or bars of wood or metal, or other materials of various sections, and dispose them so that the separate blocks may break-joint or dovetail into each other, and that the stringers, or plates, or bars may bond or unite them into a system. The stringers, plates, or bars to be disposed vertically or horizontally, or it may be at an angle, as required.

The application of these castings to piers, breakwaters, and fortifications may be cited as another example. For such structures they propose, as a foundation and for hearting the employment of balls or spherical castings of slag to be piled like shot, to interlock or arrange themselves in consequence of their weight and form, while for the superstructure and facing they employ blocks or castings of slag having the faces, or such of them as come against the spherical castings, so shaped as to cap upon and fit against the spherical castings, and thus tie or consolidate the castings or a number of them into a mass. The outer or exposed surfaces of the superstructure may present an even face, and when the material is used as ashlar or facing slabs the outer side may be cast or impressed with any desired device or pattern, while the inner side may be provided with projections of any convenient form for attaching the facing to the structure. The several facings blocks should generally break joint with each other.

THE ALKALI TRADE.

The extent and importance of the alkali trade, which is correctly described as the largest branch of chemical industry of this country, would alone suffice to attach interest to a record of its history, and of the most approved processes employed by the leading manufacturers connected with it, and the account which has been given by Mr. C. T. KINGZETT,* who, although comparatively unknown as a chemist, has evidently taken great pains to secure accuracy in his statements, is so readable and complete that he is sure to find plenty to study it. He mentions that the history of the matter shows how gradually knowledge is perfected, and remarks that at no time in the history of the alkali trade has an inventor brought into use a totally new process, so-called new processes being but perfected forms of old ones, and based upon previously known facts. After a few introductory remarks, the author plans out a scheme of the alkali trade as now worked in Great Britain, showing that (1) pyrites with nitre and air is made to yield burnt ore and sulphuric acid, the nitre being regenerated; the (2) burnt ore is treated for iron, copper, silver, and gold, whilst (2A) the sulphuric acid, as he shows, yields Epsom salts, and the sulphuric acid with salt yields hydrochloric acid and sulphate of soda; the (3) hydrochloric acid with manganese ores yields chlorine and manganese liquors; again the (4) chlorine is utilised in the resulting bleaching liquor and bleaching powder, potassic chlorate, and calcic chloride; the (4) manganese liquors have the calcic chloride separated, and the manganese is regenerated.

Returning to the (3) sulphate of soda, he shows that this salt cake with coal and limestone yield caustic soda, alkali waste, and soda carbonates, the (4) alkali waste in its turn being so treated that the sulphur is regenerated, and the lime lost. Mr. Kingzett remarks that chemical industry is just emerging from ignorance and prejudice, and any attempt to return to that state should, therefore, be opposed, for as Parkes tells us in his Chemical Essays, which at the present time are about half a century old, that it is not so many years ago that Mr. Steer, a very large aquafortis maker at Birstall, near Leeds, was for long accustomed to lay his glass retorts in a shallow rivulet which ran through his fields, where in a few weeks the indurated salt was dissolved and washed away in the water.

There can be no doubt as to Mr. Kingzett's accuracy in reminding his readers that industrial chemistry has yet much to attain, as is shown by its history, by the existence of the Alkali Acts, and by the mountains of alkali waste that stagnate the atmosphere for miles round the district where alkali works exist. But at the same time these things demonstrate what chemical science, aided by engineering, has done for the alkali trade of Great Britain, and with reference to the Continent. Dr. Lunge, in a recent address to the Tyne Chemical Society, stated that one of the largest works in Germany employs six chemists at from 300*l.* to 400*l.* per annum, and in addition retains the services of a chemist of reputation exclusively for theoretical work in the laboratory at a salary of nearly 1000*l.* per annum. That Dr. Lunge has inadvertently estimated marks as thalers, and likewise taken a very favourable course of exchange in calculating the English monetary equivalent, will be obvious to all who know anything of the scale of salaries paid in Germany and the superabundance of scientists in that country; but the propogation of such ideas will not be disadvantageous to the goals of poor German scientists who infest this country, and a purely English authority can, of course, be excused for inadvertencies of this kind. That the application of chemical knowledge in industrial works is commercially remunerrtive there can, however, be no doubt, for Mr. Kingzett, referring to Dr. Lunge's statement, says that this wise conduct gives rise to happy results, as is exemplified (to those who are conversant with the development of the soda trade in Germany) by the fact that from 1867 to 1872 the German production of sulphuric acid increased from 57,825 tons to 94,304 tons; sulphate of sodium, from 35,767 tons to 51,618 tons; and calcined soda ash from 26,250 to 26,227 tons.

After referring to pyrites, sulphur, and nitre, and the history of the manufacture of sulphuric acid to 1840, he gives a chapter on the manufacture of sulphuric acid, embracing an excellent outline of the leading principles involved in the various processes. The treatment of burnt pyrites, extraction of copper, silver, and gold, and the manufacture of sulphate of copper, are dealt with in the next chapter. An interesting historical sketch of alkali manufacture follows, and there is then a chapter on the manufacture of salt, sulphate of sodium, and hydro-chloric acid, whilst subsequent chapters treat of the manufacture of carbonate, bi-carbonate of sodium, caustic soda, and soap. The historical notes of the bleaching industry convey a good idea of the subject, and in the chapters referring to the various processes of manufacturing chlorine Weldon's chlorine and magnesia-chlorine, Deacon's and other chlorine processes, the introduction of which has revolutionised the trade within the last quarter of a century, are fully noticed. The volume, as a whole, is precisely such a one as young alkali makers and superior workmen engaged in alkali works will like to read, and the information they can obtain from it will certainly well repay them for carefully studying it.

TABLES FOR MECHANICAL ENGINEERS.

Brief reference has already been made in the *Mining Journal* to the valuable collection of tables† just completed by Mr. D. KINNEAR CLARK; but as in many parts of the volume tables and information of especial utility to miners are given, these may be noticed somewhat more in detail—such as the chapters on Steam, Combustion, Fuels, the Application of Heat, and Air Machinery, facts connected with the latter being particularly useful at the present moment when the question of the more general introduction of rock-drilling machinery in industrial mining is being so widely discussed. In the chapter on steam he shows that the appropriation of the heat expended in the generation of steam at 212° Fahr. from water supplied at 32° Fahr., may be thus exhibited:—To raise the temperature of the water to the 212° Fahr. the sensible heat absorbed will be 180·9 units, the mechanical equivalent of which is 139,655 ft.-lbs.; whilst of latent heat there will be absorbed—in the formation of steam 892·9 units of heat or 689,318 ft.-lbs., and in resisting the incumbent atmospheric pressure of 14·7 lbs. per square inch, or 2116·4 lbs. per square foot, 72·3 units of heat or 55,816 ft.-lbs.; together 965·2 heat units or 745,134 ft.-lbs., making the total, or constituent heat, 1146·1 units, or 884,789 ft.-lbs. Dr. Siemens experimenting upon the expansion of isolated steam generated at 212°, and superheated and maintained at atmospheric pressure, found that expansion proceeded rapidly until the temperature rose to 220°, and less rapidly up to 230°, or 18° above the saturation point above which it expanded uniformly as a permanent gas. Up to 230° the expansion was five times as much as that of air. From the observations of Siemens, Fairbairn, Tate, and Reginault it appears that saturated steam of ordinary temperatures may be made gaseous by superheating it to the extent of 10° to 20°. The total heat of saturated of any given temperature in Fahrenheit degrees is equal to 1081·48 plus the product of the temperature by ·305 supposing that the water from which the steam is generated is supplied at freezing point.

In the chapter on fuels the various kinds of coal are fully considered, the nature and heating power of such being carefully described. The recommendations and defects of the various kinds of patent fuel are pointed out, and there are some observations on the deterioration of coal by exposure. The quantity of residuary coke in various coals is shown to vary from 50 to 86 per cent. Anthracite coke, he remarks, scarcely deserves the name; it is without cohesion and pulverulent. The best coke from bituminous coal is clean, crystalline, and porous, and it is formed in columnar masses. It has a steel-grey colour, possesses a metallic lustre, with a metallic ring when struck, and is so hard as to be capable of cutting glass. Mr. Clark states that the quality of coke obviously depends in a great measure on the proportions of hydrogen and oxygen of the coal from which it is made, which regulate the degree of fusibility of the coal when exposed to heat. Lignite and asphalte are described, and there are a large number of interesting facts with regard to wood fuel. Peat and peat charcoal. The section on the applications of heat, comprises the principles of the transmission of heat through solid bodies. The application of the heat of furnaces for the generation of steam in boilers is also considered, and there is some useful information upon the cooling of hot water in pipes, and on the condensation of steam in pipes exposed to air. The strength of materials is, of course, very fully referred to. Kirkaldy's experimental tests, and Mr. W. Anderson's pamplet on Chernoff's experiments furnishing much of the data recorded.

The section on air machinery contains much useful information. At Powell's Duffryn Collieries experiments were made with a double cylinder air-compressing engine, having 16-in. cylinder for steam, and for air 30 in. stroke, with an air receiver of 5 ft. in diameter and 24 ft. long. The steam was cut off at 80 per cent. The air engine was an ordinary semi-portable engine having two 10-in. cylinders of 12-in. stroke cutting off at three-fourths. The air from the receiver was led into and passed through the boiler of the portable engine, and was thereby cooled down to within 5° of the atmospheric temperature before it passed into the cylinder. The results of various trials are given. One of these shows—pressure of air in receiver, 40 lbs. effective; effective mean pressure in steam cylinders, 26·3 lbs.; in air cylinders, 24 lbs.; in air engine, 35·6 lbs.; speed of piston in air and steam cylinders, 190 ft. per minute; in air engine, 108 feet. Air compressing engine, in steam cylinder (A), 59·4 ind. h.-p.; in air cylinder (B), 52·6 ind. h.-p.; air engine cylinder (C), 18·3 ind. h.-p.; air engine brake (D), 15·3 h.-p.; efficiency of D in parts of A, 25·8 per cent.; of C in ditto, 30·8; and of B in ditto, 87·7 per cent.; total pressure in receiver, 3·72 atmospheres; actual final volume in air cylinder of compressing engine (init. vol. = 1), ·380; according to adiabatic curve, ·393; hyperbolic, ·269; actual mean pressure, by indicator diagram, 24 lbs.; by adiabatic curve, 23·5; and by hyperbolic curve, 19·3 lbs. The various kinds of hot-air engines are described, as are also gas engines, fans, and ventilators. The volume has evidently been prepared with much care and consideration, and should find a place in the library of every mechanical engineer who desires accuracy in his calculations and estimates, with the least possible waste of time in making them.

FOREIGN MINING AND METALLURGY.

The French coal trade remains very quiet, and contracts are secured with more or less difficulty. The Nord and the Pas-de-Calais have received some orders, but other negociations have fallen through, in consequence of there having been too large a difference between the offers of buyers and the demands of sellers. Prices appear to be as low as they well can be, and no further fall of any importance seems possible. In the basin of the Loire deliveries are still pretty well maintained. In the North of France coal, it may be observed, is now slightly lower than it was before the war. The production of coal in the basin of the Nord in 1876 was 3,315,000 tons, as compared with 3,372,000 tons in 1875. The production of the Pas-de Calais in 1876 was 3,312,000 tons, as compared with 3,242,000 tons in 1875. The combined production of the two basins last year was thus 6,627,000 tons, as compared with 6,614 000 tons in 1875. The increase in the production of the two basins last year, as compared with 1875, was thus 13,000 tons; as compared with 1874, the corresponding increase was 345,000 tons, and as compared with 1873 137,000 tons.

The administration of the Belgian State Railways has just let contracts for the supply of about 62,500 tons of coal required for the service of those lines. The prices at which the contracts were let show a fall of about 1s. 8d. per ton, as compared with the contract rates of a year since. A spacious new quay for the unloading of coal cargoes is about to be opened at Antwerp. This quay will be available for ships drawing 20 ft. of water; land is also avoilable in the neighbourhood of the quay for the formation of coal depôts. Works for completing the Termonde barrage will be commenced June 15. These works will involve a suspension of navigation on the Dendre in this neighbourhood for at least three months. The Gosson-Lagasse Colliery Company has been distributing 1*l.* 12s. per share as the balance of its dividend for 1876.

Business in copper has been a good deal curtailed at Paris, and holders have supported previous prices with some difficulty. Chilian in bars has made 76*l.*; ditto ordinary descriptions, 73*l.*; ditto in ingots, 77*l.* 10s.; English best selected, 78*l.* 10s.; and pure Corocoro minerals, 76*l.* per ton. Upon the German copper markets the situation has scarcely changed; transactions are not very numerous, but prices have been maintained. There has not been very much doing in tin at Paris; Banca, delivered at Havre or Paris, has made 77*l.*; Billiton, 72*l.* 10s.; Straits, 76*l.*; Australian, 75*l.*; and English, delivered at Havre or Rouen, 76*l.* per ton. Business has been done in Banca at Rotterdam at 42½ fl.; at this price there are still sellers. Disposeable Billiton has remained scarce at Rotterdam; some transactions have taken place with delivery in May and June at 41¾ fl. The German tin markets have been very quiet, and prices have remained without any sensible change. French, Belgian, and German lead have brought 21*l.* per ton at Paris, other descriptions have realised 20*l.* 16s. per ton in the same capital. The German lead markets have been firm, at the same time prices have not experienced any change. The Paris zinc market has not presented any very great activity, at the same time prices have been about maintained. At Marseilles rolled Vieille Montague zinc has been quoted at 30*l.* per ton.

It does not appear probable that political complications can do much harm to the French iron trade. The present indecision may bring with it a slight slackening in orders for a time, but it is little likely that a war in the East of Europe can have much effect upon French metallurgical affairs so long as France remains neutral. With regard to the renewal of treaties of commerce the Committee of French Forgemasters has, it appears, decided to address to the Minister of Public Works a *memoire* advocating the integral maintenance of the duties proposed to be imposed upon metallurgical products by the Superior Council of Commerce. The French iron trade presents much the same aspect as for some time past. Small orders continue to come to hand, and the readiness with which the works accept this class of orders has brought back many direct clients, to the detriment of certain merchants. Pig remains at a very low point in France—between 2*l.* 8s. and 2*l.* 10s. per ton. The Mokta-el-Hadid Magnetic Iron Minerals Company will pay on May 1 the balance of its dividend for 1876, or 1*l.* 12s. per share.

The Belgian iron trade remains in much the same state. Business is not without animation; at the same time producers do not realise very satisfactory profits. The Belgian Consul at Ogsaka, Japan, in a report to the Belgian Minister of Foreign Affairs, expresses an opinion that some outlets might be found for Belgian iron in Japan. Belgian iron is now definitively classed upon the Chinese market. The German Federal Council has just adopted in the form proposed by Prussia a Bill providing that "compensatory duties" shall be imposed on certain descriptions of iron and steel, and certain articles manufactured with iron and steel. The Associations of Engineers educated at the Liége School has just decidedthat its excursion for 1877 shall be made to Aix-la-Chapelle. The excursion will come off May 12, and the principal industrial establishments of the town, as well as its Polytechnic School, will be visited on the occasion. The Rhenish Railway Company is about to let a contract or contracts for the construction of 300 coal wagons. According to a report presented by the Belgian Minister of Public Works to the Chamber of Representatives there were at the close of 1875 some 4,734,234 wooden sleepers in use upon the Belgian State Railways. To replace these sleepers with iron sleepers would absorb 165,000 tons of iron, of the estimated value of 990,000*l.*

THE BUSSE GOVERNOR.—The complicated character of the Busse governor was noticed in the *Mining Journal* shortly after its invention, and Messrs. Schäffer and Budenberg, of Buckau, Magdeburg, provisionally protected, but did not secure a patent in this country for an improvement. Instead of having the balls of the pendulums above their fulcrums they are arranged to hang below such fulcrums, with their weighted arms resting upon the top of a hollow shaft, with which such pendulums revolve. These pendulums are mounted in a suitable frame, within which their weighted arms are conveniently disposed, and this frame is capable of rising and falling upon the hollow shaft herein-before mentioned, and is connected at its upper extremity to a spindle which passes downwards through such hollow shaft to the throttle-valve, or other apparatus requiring to be controlled by the governor. By this construction of Busse governor a simpler appearance is obtained, and the governor is connected in a more direct and simpler manner to the throttle-valve, or other apparatus requiring to be controlled.

SALES OF COPPER ORES.

COPPER ORES SOLD AT THE CORNWALL TICKETING, FOR THE QUARTER ENDING MARCH 31, 1877.

Mine.	Tons.	Amount.
South Caradon	1410	£9,388 7 6
Devon Great Consols	2461	9,175 16 6
West Tolgus	794	4,578 5 6
West Wheal Seton	940	4,239 3 0
Marke Valley	1081	3,627 14 0
Glasgow Caradon	750	3,176 13 0
Gunnislake (Clitters)	611	3,000 18 6
Mellanear	611	2,406 5 0
East Caradon	360	1,615 3 6
Brookwood	405	1,481 8 0
Hingston Down	510	1,462 7 6
East Pool	295	1,250 16 0
South Wheal Crofty	426	1,187 19 0
Bedford United	174	1,110 1 0
Levant	115	938 3 0
Phœnix	120	635 0 0
Wheal Crebor	204	628 11 6
Killifreth	60	503 14 6
Carn Brea	156	488 8 0
West Maria and Fortescue	195	488 5 0
Botallack	50	481 5 0
Wheal Basset	76	414 3 0
Gawton	162	341 9 0
Wheal Russell	143	331 6 6
St. Aubyn United	54	284 17 0
South Carn Brea	64	257 15 0
Prince of Wales	100	245 6 0
Holmbush	305	228 10 0
Wheal Emma	78	206 16 0
Penstruthal	44	202 13 0
West Poldice	39	180 7 6
Unity Wood	40	167 9 0
Coombe Works	130	165 17 0
Belstone	35	160 0 0
South Roskear	29	150 1 6
New St. Agnes	15	142 2 6
West Godolphin	5	135 5 0
Cathedral	35	134 1 6
Wheal Grenville	19	118 6 6
North Treskerby	20	102 0 0
West Basset	27	94 10 0
Carn Camborne	35	78 6 0
Wheal Friendship	18	54 9 0
Dolcoath	14	45 10 0
Condurrow	20	41 5 0
Brenton's Ore	12	39 0 0
Wheal Agar	7	35 7 0
Treleigh Wood	9	32 3 6
Wheal Seton	6	27 0 0
Okel Tor	10	16 5 0
Burra Burra	3	12 15 0
Gavid's Ore	4	10 14 0
South Tolcarne	4	10 0 0
New Rosewarne	3	8 8 0
Phillip's Ore	2	6 16 0
East Grenville	6	5 11 0
Carn Camborne	4	4 0 0

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Purchasers.	Tons.	Amount.
Vivian and Sons	2812	£12,435 18 2
P. Grenfell and Sons	1646	8,780 3 9
Nevill, Druce, and Co.	2219	7,447 12 6
Williams, Foster, and Co.	2376	9,560 7 2
Mason and Elkington	1739	6,725 7 2
Charles Lambert	1393	5,288 5 10
Newton, Keates, and Co.	143	665 13 3
Sweetland and Co.	1079	5,451 1 2
Total	13,407	£56,354 9 0

COPPER ORES SOLD AT THE SWANSEA TICKETINGS, FOR THE QUARTER ENDING MARCH 31, 1877.

Mines.	Tons.	Amount.
BRITISH.		
Berehaven	273	£ 2,122 8 0
Tigrony Precipitate	23	863 1 6
Cronebane	307	410 9 0
Total	603	£ 3,395 18 6
COLONIAL.		
Cape	2948	£63,341 2 0
Betts' Cove	3618	21,757 14 6
Union	1463	4,662 15 0
Kurilla	217	2,720 13 6
Australian	16	165 13 6
Total	8262	£92,647 18 6
FOREIGN.		
New Quebrada	235	£ 3,281 5 0
Carracedo	355	3,196 9 6
Portuguese	162	2,993 19 0
Var	181	1,739 18 0
Norway	169	870 7 0
Total	1102	£12,080 18 6
RECAPITULATION.		
British	603	£ 3,395 18 6
Colonial	8262	92,647 18 6
Foreign	1102	12,080 18 6
Regulus and Sundries	224	1,755 11 6
Total	10,191	£109,880 7 0

COMPANIES BY WHOM THE ORES WERE PURCHASED.

Purchasers.	Tons.	Amount.
P. Grenfell and Sons	1368	£16,808 8 6
Nevill, Druce, and Co.	628	9,957 1 3
Vivian and Sons	3559	21,812 17 6
Williams, Foster, and Co.	2179	26,785 7 0
Mason and Elkington	1161	8,996 1 3
British and Foreign Copper Company	116	2,263 2 0
Charles J. Lambert	201	3,410 11 6
Sweetland and Co.	451	8,050 13 6
Landore Copper Company	527	11,796 4 6
Total	10,191	£109,880 7 0

A REAL OWNER'S ACCOUNT MAN.—"I tell thee, Jemmy Bartle," says old Capt. Joe, "thee'rt a lazy fellow, and it takes me *half* of my time to watch thee.' "'Iss sure, Capt. Joe," says Jemmy, "and it takes *all* my time to watch you."—From *Cousin Jack's MS.*

ARTIFICIAL MARPLE.—In the manufacture of artificial marble, so as to produce greater hardness in the material than has hitherto been obtained, Mr. L. A. Brode, of Glasgow, has patented a very simple improvement. The basis of the new material is the same as that used in such artificial marble or stone as has hitherto been produced—Keene's cement—with which colouring matter either in a pulverent condition or as a liquid is mixed, according to the colours and characters of the artificial marble or stone which it is desired to imitate. In order to produce the requisite hardness of the artificial marble or stone, and which feature constitutes the essense of the invention, there is mixed with the Keen's cement a portion of finely ground glass and salt, or finely ground glass and alum. Proportions of these substances which are found to answer in practice are—Keene's cement, 10 parts; ground glass, 1 part; and and salt or alum ½ part by weight; but these proportions may be considerably varied. A further feature, which is important to the success of the invention is that the substances are commingled together with hot water, although cold water may be used.

* "The History, Products, and Processes of the Alkali Trade, including the most Recent Improvements." By CHARLES T. KINGZETT. London: Longmans.

† "A Manual of Rules, Tables, and Data for Mechanical Engineers," Based on the most recent investigations. By DANIEL KINNEAR CLARK, M.I.C.E., &c. London: Blackie and Son, Paternoster Buildings.

EXTRACTING METALLIC ZINC.

The principal object of the invention of Mr. F. LAURENT CLERC, of Bethlehem, Pennsylvania, is to save labour and fuel by making the process of reduction a continuous one, and dispensing with the use of retorts or muffles, thereby applying the fuel more economically, and generating the heat in the charge where it is required, instead of transmitting it through walls of fire-clay. The improved process consists in the reduction of the metal in the form of gas; the protection of the metallic vapour from re-oxidation; the condensation of the metallic vapour to a liquid form; and the removal of the residues of the ore and ashes of the fuel. The operations are carried on continuously and simultaneously by feeding a charge of calcined ore, fuel, and flux, mixed together and crushed (say) to about the size of a pea into a properly constructed furnace in such a manner that the charge is thoroughly dried and heated before reaching the furnace, and is always covered in the furnace by a layer of heated carbonaceous fuel. By these means the oxidation of the distilling zinc vapours is prevented, whilst at the same time the deoxidation of the carbonic acid gas is ensured. The next step consists in injecting through the tuyeres into and through the charge a blast of air heated to a temperature above the melting point of zinc. Drawing off the gases from the top of the furnace at a temperature considerably above the melting point of zinc, and causing them to pass slowly through condensing flues of fire-brick, which are not allowed to fall below that temperature. And, lastly, he fuses the residue of the ore with the ashes of the fuel by means of a suitable flux, and running them out at the bottom of the furnace. The gases are withdrawn from the condensing flues after they have become cooled below the temperature of melting zinc, and are rapidly cooled in iron pipes, after which whatever zinc has escaped condensation is washed out of them in the form of a metallic dust known as blue powder. The resultant blue powder is dried and returned to the furnace in a subsequent charge.

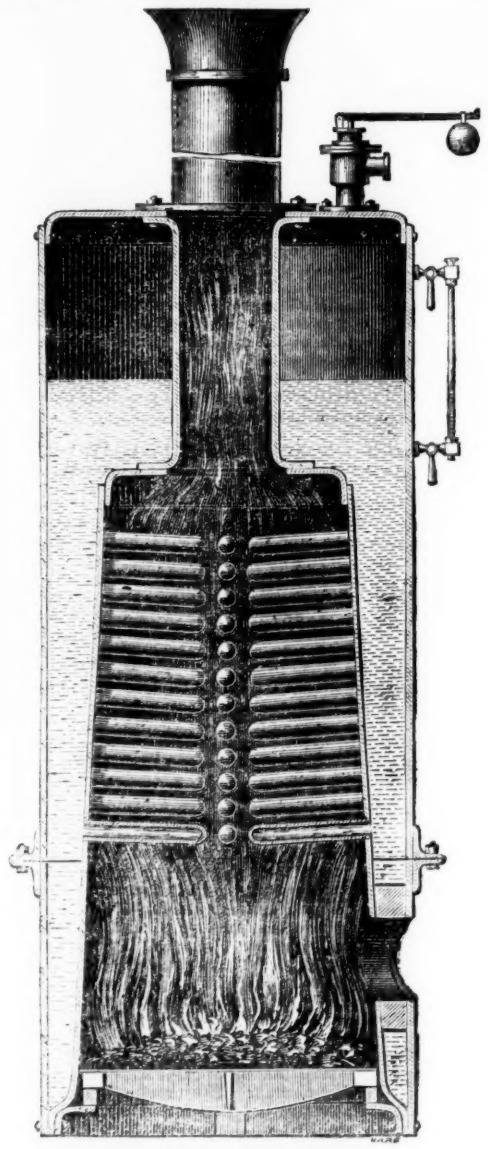
The furnace which is by preference employed is made in the form of an inverted frustrum of a widely glaring cone resting on a cylindrical shaft called the hearth. It is arched over by a dome having a large central opening and lateral openings or transverse passages. In the hearth of the furnace are openings for the insertion of tuyeres, a slag eye, and in special cases an additional tapping hole. The feeding apparatus consists of a shaft, the lower portion of which is of fire-brick, extending through the dome into the furnace, and terminating at the top in a hopper, through which descends into the shaft an inner shaft supported by arms. The condenser is placed over and around the furnace, and consists of fire-brick flues (say), for example, 12 in number, passing over the dome of the furnace. These flues communicate with each other at the top in sets of four through the transverse passages before mentioned, and lead into three chimneys. At the bottom they are connected together in sets of two adjacent flues uniting to form around the furnace receptacles for the collection of the condensed metal, the bottoms of these receptacles being inclined towards each other, and converging to the tapping holes. The sides of the flues are formed by a number of arched radial walls (say), for example, 12, extending over and across the furnace, but interrupted in the centre to admit the feeding shaft. These walls also support the dome of the furnace and the lower portion of the feeding shaft, and are continued above the flues to carry the superstructure to the furnace. The dome of the furnace forms the bottom common to all the flues. The condenser carrying with it the dome of the furnace, feeding shaft, and other contiguous parts is built on an annular iron bed-plate, which may be supported by a double row of pillars. The washing apparatus consists of a series of vertical pipes connected near the top with the chimneys by means of cooling pipes. These vertical pipes communicate with an upper water tank, and each pipe is covered with a finely perforated plate. The lower ends of the pipes enter a covered water-tank, the bottom of which is divided into a series of receptacles, the sides of the latter converging to a series of discharging orifices. The cover is so constructed as to form an air chamber above the level of the water from which the trapped gases pass off through suitable pipes.

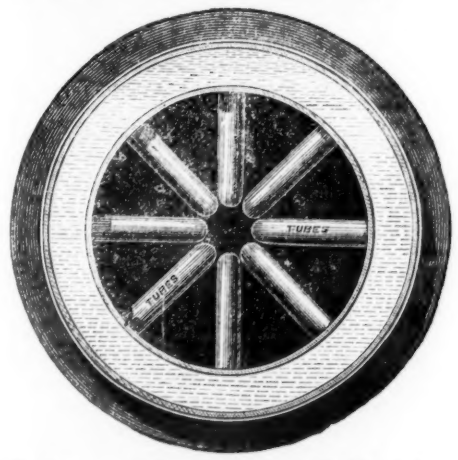
The furnace having been dried and lighted like an ordinary blast-furnace, it is charged with an intimate mixture of calcined ore crushed (say) to about the size of a pea, or of oxide of zinc, artificially prepared with proper proportions of fuel and flux, to which may be added the blue powder recovered in the washer from a previous charge. About half of the coal should be crushed as fine as the ore, the remainder may be somewhat larger. Quicklime, iron, or the oxides of manganese are generally applicable as fluxes. With rich ores, a fusible slag, and a highly-heated blast a weight of coal equal to one-half the weight of the charge will be found sufficient. The charge is fed into the inner hopper as fast as it sinks in the shaft, and at the same time some charcoal or soft coke easily acted upon by carbonic acid is fed into the interior hopper. As they descend together they unite in a solid column, and are gradually heated before reaching the furnace, on entering which they spread out, falling with a natural "talus" to the outer wall of the furnace. The charcoal being on the outside is thrust upwards, forming a layer on the top of the charge, where, as it is deposited gradually and in close proximity with the heated dome of the furnace, it is maintained at a sufficiently high temperature to reduce the issuing gases. As the oxide of zinc descends in the furnace the metal is reduced, and being liberated in the form of a gas it rises with the other gases, passes through the layer of heated charcoal or its equivalent (in which operation whatever carbonic acid there may be remaining in the accompanying gases is effectually reduced to carbonic oxide, and escaping from its free surface issues into the condenser through the passage ways. In passing through the condensing conduits it parts slowly with its heat and condenses into drops, which run together and collect in the receptacles before mentioned, from which it is withdrawn from time to time. After leaving the condenser the gases are rapidly cooled by passing them through the cooling pipes before they reach the washer which they enter near the top of the vertical pipes, and descend along with a shower of water from the water-tank above into the covered tank. The cooling pipes should be constructed so as to be capable of being replaced by duplicate pieces when they become obstructed. The blue powder is washed out, and is withdrawn through orifices at the bottom, and the washed gases pass off through pipes to be burned, as in the iron furnace for heating the blast and other purposes. When the ore contains any metal, such, for example, as copper, manganese, or iron, which is not volatile at the temperature obtained, and which does not flux with the "gangue" in the reducing atmosphere to which it is exposed, it may be collected at the bottom of the furnace, and run out through a lower tapping hole in the form of a metal matte, or spiegeleisen.

SOAPSTONE PAVING SLABS.—The object of the invention of Mr. CRISTOFORO MURATORI, of Hackney, is to render all fibres, fabrics, and other porous or other absorbent substances waterproof and impervious to the action of cold, heat, damp, and all other influences of climate. For this purpose he makes use of the magnesic silicate of alumina, known as seifenstein or soapstone, found in nature, reduces it to a fine powder, the finer the better, and washes it if required by immersing it in hot water, stirring it, and then drawing off the water. He mixes this substance when dry in equal proportions with a resinous liquid, preferring tar on account of its cheapness. With the resulting composition he coats the fabric or substance to be treated by either dipping into a bath of the composition or laying the composition on in any convenient manner, removing the excess by means of a spreader and scraper, but taking care to leave a thin equal coating of the composition over the whole surface on one or both sides of the substance so treated. He prepares the latter for coating with the composition or not as may be desirable. He then allows the composition to dry upon the substance by exposure to the air for about 24 hours, but can hasten this drying by artificial means. He also mixes this substance with other substances as well as liquid resin and size; he takes 20 parts of soapstone to 1 of liquid caoutchouc, and mix well together. He then adds any siccative oil to this mixture until the whole is brought to the consistency of honey, and the resulting composition is to be used as above. To this composition he can add any colour desired. He also mixes 2 parts of soapstone with 1 part of size, and the resulting composition may be used as a preparatory coating for that firstly described or the others, or for coating the opposite side of the fabric to that covered with the first composition. He takes solid resin and renders them liquid by means of heat, and adds as much powdered soapstone until the whole dries into a solid mass under the action of the heat; and while it is still warm and yet retains a certain suppleness he can mould it into any desired form, so as to render it applicable for use as paving slabs and other like purposes. The soapstone he unites in equal proportions with ordinary colour, either with oil, glue, or varnish, and forms with them paints more durable than ordinary ones.

VERTICAL BOILER WITH RADIAL WATER TUBES.

A new type of vertical boiler, which is reported to have given good results in practice, is at present being introduced by Messrs. PLAMBECK and DARKIN, of Queen Victoria-street. The boiler, which is the invention of Mr Pope, is designed with a special view to meet the requirements of maximum rate of evaporation in a minimum space, and with the least weight and material. In a series of careful trials it was found that the boiler with ordinay chimney and no blast evaporated 8·8 lbs. of water per lb. of coke, the water being fed at 55° temperature. With fast combustion hard steam coal evaporated 8·37 lbs. of water per lb., and with slow combustion 8·84 lbs. of water per lb. of fuel. Under similar conditions Aberdare Merthyr evaporated 9·06 lbs. of water and 10·94 lbs. of water per lb. of fuel. The arrangements during the trials were the usual ones of the water being evaporated at atmospheric pressure, with an open escape-pipe. From this escape-pipe was taken a ¾-in. branch to the chimney, which might thus at pleasure be used as a weak blast. It is suggested that this boiler in conjunction with West's six cylinder engine, illustrated some time since in the *Mining Journal*, and supplied by the same firm, is at once the most compact and economical steam-power for a great variety of purposes. The boiler is a rapid steam generator, and gives good evaporative results; the engine gives a large percentage of useful effect, and both are described as compact and portable, and require little attention.





From the above engravings it will be seen that the boiler is composed of the usual external shell and internal fire-box, but the latter is exceptionally high, and is filled with radial tubes from its circumference to the centre. These tubes are closed with a semi-spherical end, and usually about eight tubes are inserted in a row. They are only made of 11 B.W.G., since the bursting pressure is altogether internal, and the evaporation is thus very effective from them. Owing to the rapidity of the evaporation and rapid scour, a circulation will be set up in the tubes, and thus materially serve to keep them clean. The radial position of the tubes from the walls of the box inwards with only one end fixed allows free expansion under heat, and prevents leaking, to which rigid tubes are subjected. They are much safer under internal pressure than those subjected to an external crushing strain. They are also much more likely to keep tight under the former circumstances, as the internal pressur serves to expand them, and keep the joint tight. These tubes hav the advantages of the field tubes for easy withdrawal and repair after once the top shell has been lifted. A flange-bolted joint is supplied for this purpose just above the fire-door, and the chimney joint must be broken at the same time. When the shell is lifted the tubes are all perfectly open for withdrawal, cleaning, and replacement. It is stated that the boiler has been severely tested for several years with the most excellent results. It will attain a very high pressure with perfect safety up to 150 lbs. per square inch, if required.

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WITH OR WITHOUT

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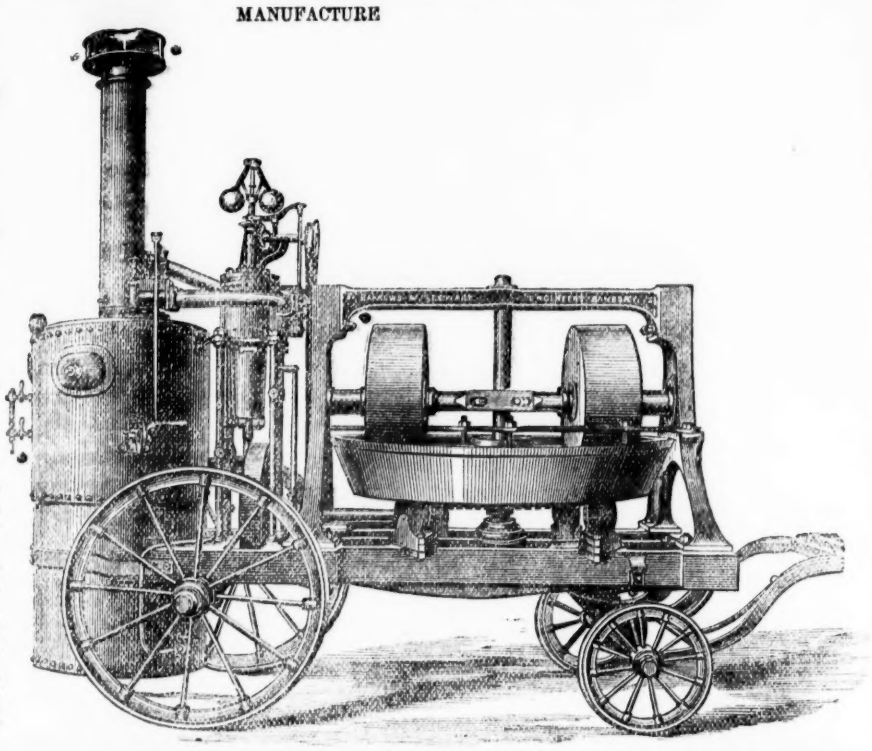

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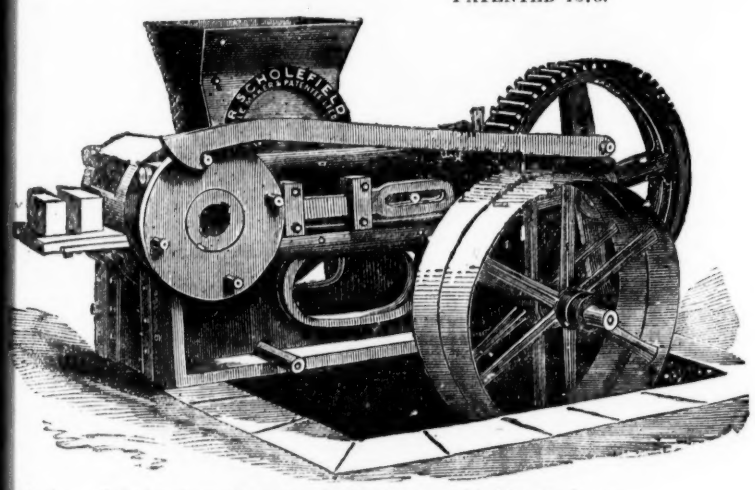
PATENTED 1873.



R. S. begs to call the attention of all Colliery Owners in particular to his PATENT SEMI-DRY BRICK MACHINE, and the economical method of making bricks by his patent machinery from the refuse that is taken from the pits during the process of coal-getting, which, instead of storing at the pit's mouth (and making acres of valuable land useless), is at once made into bricks, at a very small cost, by R. S.'s Patent Brick-making Machinery. If the material is got from the pit hill, the following is about the cost of production, and the hands required to make 10,000 pressed bricks per day:—

2 men digging, each 4s. per day	£0 8 0
1 man grinding, 4s. 6d. per day	0 4 6
1 boy taking off bricks from machine, and placing them in barrow ready for the kiln, 2s. per day	0 2 0
1 boy greasing, 1s. 6d. per day	0 1 6
1 engine-man, 5s. per day	0 5 0
1 man wheeling bricks from machine to kiln, 4s. per day	0 4 0
Total cost of making 10,000 pressed bricks	£1 5 0, or 2s. 6d. per 1000.

(SETTING AND BURNING SAME PRICE AS HAND-MADE BRICKS.)

N.B.—Where the material can be used as it comes from the pit, the cost will be reduced in digging.

As the above Machinery is particularly adapted for the using up of shale, bind, &c., it will be to the advantage of all Colliery Owners to adopt the use of the said Brick-making Machinery.

THE MACHINES CAN BE SEEN IN OPERATION AT THE WORKS OF THE SOLE MAKER AND PATENTEE DAILY.

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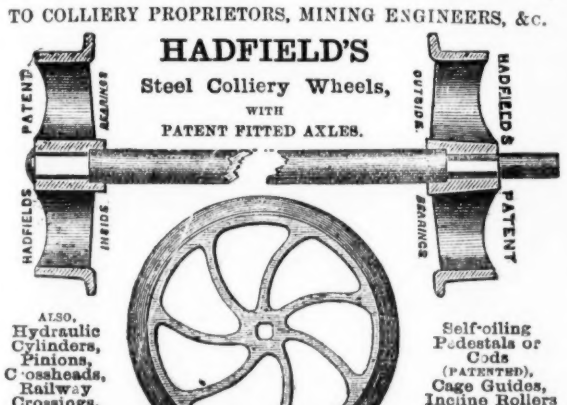

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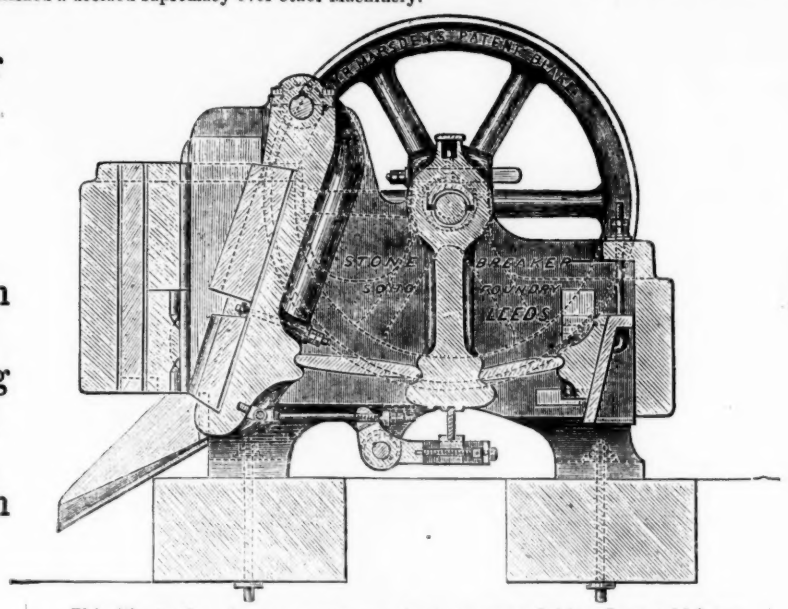

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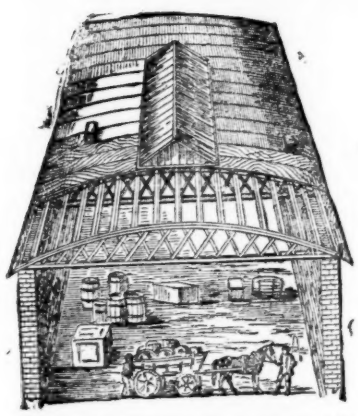

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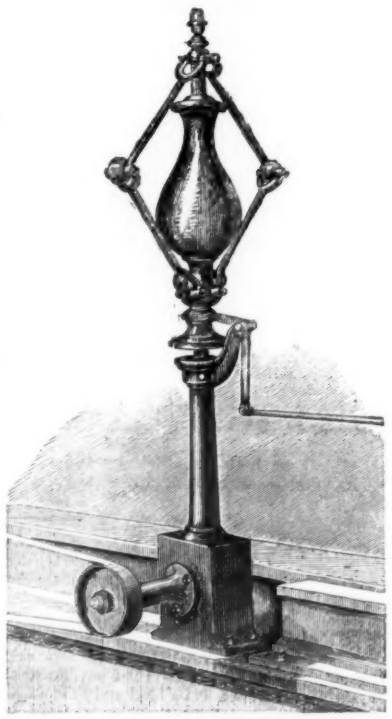

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